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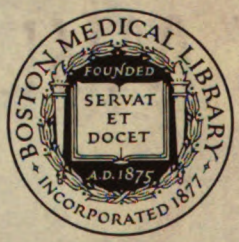

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TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

VOLUME 45

FOR THE YEAR 1920

EDITED BY GEORGE GRAY WARD, Jr., M.D.

PHILADELPHIA
WM. J. DORNAN, PRINTER
1920

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GEORGE GRAY WARD, JR., M.D., *Editor*,
48 EAST FIFTY-SECOND STREET, NEW YORK.

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OFFICERS AND FELLOWS

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

1920

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OFFICERS FOR 1920*

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ROBERT L. DICKINSON, NEW YORK

VICE-PRESIDENTS

J. CLARENCE WEBSTER, CHICAGO
JENNINGS C. LITZENBERG, MINNEAPOLIS

TREASURER

BROOKE M. ANSPACH, PHILADELPHIA

SECRETARY

GEORGE GRAY WARD, JR., NEW YORK

MEMBERS OF THE COUNCIL

J. WESLEY BOVÉE, WASHINGTON
[To serve one year]

FRANK FARROW SIMPSON, PITTSBURGH
[To serve two years]

JOHN G. CLARK, PHILADELPHIA
[To serve three years]

FRANKLIN H. MARTIN, CHICAGO
[To serve four years]

OTHER MEMBERS OF THE COUNCIL

GIDEON BROWN MILLER, WASHINGTON
CHARLES C. NORRIS, PHILADELPHIA
[To serve one year]

* Officers for the ensuing year may be found in the minutes of the meeting, page lxv.

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LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME

* Deceased.

	President.	Vice-Presidents.	Secretary.	Treasurer.
1876.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1877.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1878.	*Edmund R. Peaslee	*William Goodell, *Isaac E. Taylor	*James R. Chadwick	*Paul F. Mundé
1879.	*T. Gaillard Thomas	*D. Humphreys Storer, *Henry P. C. Wilson	*James R. Chadwick	*Paul F. Mundé
1880.	*J. Marion Sims	*W. T. Howard, *Robert Battey	*James R. Chadwick	*Paul F. Mundé
1881.	*W. H. Byford	*T. A. Reamy, *H. F. Campbell	*James R. Chadwick	*Paul F. Mundé
1882.	*Thomas Addis Emmet	*George H. Lyman, *Emil Noeggerath	*James R. Chadwick	*Paul F. Mundé
1883.	*Gilman Kimball	*Albert H. Smith, *Theophilus Parvin	*Frank P. Foster	*Paul F. Mundé
1884.	*Albert H. Smith	*James R. Chadwick, *Samuel C. Busey	*Frank P. Foster	Matthew D. Mann
1885.	*William T. Howard	Wm. L. Richardson, *Paul F. Mundé	*Frank P. Foster	Matthew D. Mann
1886.	*Thaddeus A. Reamy	*Theophilus Parvin, *Geo. J. Engelmann	Joseph Taber Johnson	Matthew D. Mann
1887.	*Alex. J. C. Skene	John C. Reeve, *Ellwood Wilson	Joseph Taber Johnson	Matthew D. Mann
1888.	*Robert Battey	*A. Reeves Jackson, *James R. Chadwick	Joseph Taber Johnson	Matthew D. Mann
1889.	*Henry P. C. Wilson	*William T. Lusk, *Edward W. Jenks	Joseph Taber Johnson	Matthew D. Mann
1890.	*John P. Reynolds	*William M. Polk, *Ely Van de Warker	Joseph Taber Johnson	Matthew D. Mann
1891.	*A. Reeves Jackson	Joseph Taber Johnson, *William H. Baker	Henry Clark Coe	Matthew D. Mann
1892.	*John Byrne	*Richard B. Maury, *Cornelius Kollock	Henry Clark Coe	Matthew D. Mann
1893.	*Theophilus Parvin	*William H. Parish, *William H. Baker	Henry Clark Coe	Matthew D. Mann
1894.	*William T. Lusk	*Samuel C. Busey, Bache McE. Emmet	Henry Clark Coe	Matthew D. Mann
1895.	Matthew D. Mann	*Geo. J. Engelmann, Clement Cleveland	Henry Clark Coe	J. Montgomery Baldy

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	President.	Vice-Presidents.	Secretary.	Treasurer.
1896.	*William M. Polk	*James H. Etheridge, *Fernand Henrotin	Henry Clark Coe	J. Montgomery Baldy
1897.	*James R. Chadwick	*R. Stansbury Sutton, *Henry J. Garrigues	J. Riddle Goffe	J. Montgomery Baldy
1898.	*Paul F. Mundé	Emilius C. Dudley, *Arthur W. Johnstone	J. Riddle Goffe	J. Montgomery Baldy
1899.	Joseph Taber Johnson	Howard A. Kelly, *A. F. A. King	J. Riddle Goffe	J. Montgomery Baldy
1900.	*George J. Engelmann	*Edward L. Duer, Seth C. Gordon	J. Riddle Goffe	J. Montgomery Baldy
1901.	*Ely Van de Warker	*Charles Jewett, *Richard B. Maury	J. Riddle Goffe	J. Montgomery Baldy
1902.	Seth C. Gordon	*George M. Edebohls, Edward Reynolds	J. Riddle Goffe	J. Montgomery Baldy
1903.	*Joseph E. Janvrin	*Edward W. Jenks, *A. Palmer Dudley	J. Riddle Goffe	J. Montgomery Baldy
1904.	Edward Reynolds	J. Whitridge Williams, Edward P. Davis	J. Riddle Goffe	J. Montgomery Baldy
1905.	E. C. Dudley	*Henry D. Fry, Henry C. Coe	J. Riddle Goffe	J. Montgomery Baldy
1906.	*Richard B. Maury	Howard A. Kelly, Reuben Peterson	J. Riddle Goffe	J. Montgomery Baldy
1907.	Clement Cleveland	Willis E. Ford, J. Clifton Edgar	J. Riddle Goffe	J. Montgomery Baldy
1908.	J. Montgomery Baldy	I. S. Stone, Eugene Boise	J. Riddle Goffe	Charles P. Noble
1909.	J. Riddle Goffe	Howard A. Kelly, Malcolm McLean	Le Roy Broun	J. Wesley Bovée
1910.	Edward P. Davis	Seth C. Gordon, Edward Reynolds	Le Roy Broun	J. Wesley Bovée
1911.	Reuben Peterson	John F. Thompson, John G. Clark	Le Roy Broun	J. Wesley Bovée
1912.	Howard A. Kelly	Richard R. Smith, John A. Sampson	Le Roy Broun	J. Wesley Bovée
1913.	Henry C. Coe	George H. Noble, George Gellhorn	Le Roy Broun	J. Wesley Bovée
1914.	J. Whitridge Williams	Thomas J. Watkins, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1915.	Thomas J. Watkins	Frank Farrow Simpson, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1916.	J. Wesley Bovée	Robert L. Dickinson, George Gellhorn	Le Roy Broun	Brooke M. Anspach
1917.	Frank Farrow Simpson	Le Roy Broun, W. Francis B. Wakefield	George Gray Ward, Jr.	Brooke M. Anspach
1918.	John G. Clark	Henry T. Byford, *Brooks H. Wells	George Gray Ward, Jr.	Brooke M. Anspach
1919.	Franklin H. Martin	Edward E. Montgomery Wm. E. Studdiford	George Gray Ward, Jr.	Brooke M. Anspach
1920.	Robert L. Dickinson	J. Clarence Webster, J. C. Litzenberg	George Gray Ward, Jr.	Brooke M. Anspach

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HONORARY FELLOWS

American

Elected

1920. WILLIAM E. ASHTON, M.D., 2011 Walnut St., Phila., Pa.
1914. B. F. BAER, M.D., 2115 Chestnut St., Philadelphia, Pa.
1919. J. MONTGOMERY BALDY, M.D., Devon, Chester Co., Pa.
1917. HERMANN J. BOLDT, M.D., 616 Madison Ave., New York.
1912. B. BERNARD BROWNE, M.D., 510 Park Ave., Baltimore.
1918. CLEMENT CLEVELAND, M.D., 925 Park Ave., New York.
1915. HENRY C. COE, M.D., 616 Madison Ave., New York.
1914. ANDREW F. CURRIER, M.D., 173 East Lincoln Ave., Mt. Vernon, N. Y.
1914. FRANCIS H. DAVENPORT, M.D., 390 Commonwealth Ave., Boston, Massachusetts.
1917. EMILIUS CLARK DUDLEY, M.D., 122 South Michigan Ave., Chicago, Ill.
1912. BACHE McE. EMMET, M.D., 535 Park Ave., New York.
1915. WILLIS E. FORD, M.D., Utica, New York.
1905. WILLIAM GARDNER, M.D., 457 Sherbrooke St., W., Montreal, Canada.
1914. EUGENE C. GEHRUNG, M.D., 4177 King St., Denver, Col.
1915. SETH CHASE GORDON, M.D., Portland, Maine.
1920. CHARLES M. GREEN, 78 Marlborough St., Boston, Mass.
1920. GEORGE TUCKER HARRISON, University of Virginia, Va.
1916. PHINEAS H. INGALLS, M.D., 49 Pearl St., Hartford, Conn.
1915. JOSEPH TABER JOHNSON, M.D., Cherrydale, Virginia. *Founder.*
1909. MATTHEW D. MANN, M.D., 37 Allen St., Buffalo, N. Y.
1917. CHARLES P. NOBLE, M.D., 1832 Spruce St., Phila., Pa.
1897. JOHN C. REEVE, M.D., LL.D., Dayton, Ohio. *Founder.*
1917. EDWARD REYNOLDS, M.D., 321 Dartmouth St., Boston, Mass.
1903. WILLIAM L. RICHARDSON, M.D., 225 Commonwealth Ave., Boston, Mass. *Founder.*
1918. W. GILL WYLIE, M.D., 28 West 40th St., New York.

Foreign

1878. J. AMÉDÉE DOLÉRIS, M.D., 7 Rue de Logelbach, Paris, France.

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ELECTED

1909. ALBAN HENRY GRIFFITHS DORAN, F.R.C.S. (England), 6 Palace Mansions, Addison Bridge, Kensington, London.
1899. D. BERRY HART, M.D., 13 Northumberland Street, Edinburgh, Scotland.
1909. MAX HOFMEIER, M.D., Schoenleinster 4, Würzburg, Germany.
1895. CHARLES JACOBS, M.D., 53 Boulevard de Waterloo, Brussels, Belgium.
1912. J. M. MUNRO KERR, M.D., 7 Clairmont Gardens, Glasgow, Scotland.
1888. AUGUST MARTIN, M.D., Berlin-Schöneberg Freiheer vom Steinstr.
1912. W. NAGEL, M.D., Potsdamerstr. 121h, Berlin W. 35, Germany.
1909. HERBERT R. SPENCER, M.D., 104 Harley St., W. London, Eng.
1901. TH. TUFFIER, M.D., 42 Avenue Gabriel, Paris, France.

Total, thirty-five Honorary Fellows.

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HONORARY FELLOWS

DECEASED

Elected		Died
1888.	THOMAS A. ASHBY, M.D., Baltimore, Maryland.	1916
1877.	JOHN L. ATLEE, M.D., Lancaster, Pa.	1885
1884.	GEORGE GRANVILLE BANTOCK, M.D., London, England.	1913
1910.	WILLIAM H. BAKER, M.D., Boston, Massachusetts.	1915
1876.	ROBERT BARNES, M.D., London, England.	1907
1892.	ROBERT BATTEY, M.D., Rome, Georgia. *Founder.*	1895
1878.	JOHN S. BILLINGS, M.D., LL.D., New York City.	
1897.	SAMUEL C. BUSEY, M.D., LL.D., Washington. *Founder.*	1901
1910.	J. CHALMERS CAMERON, M.D., Montreal, Canada.	1912
1890.	HENRY F. CAMPBELL, M.D., Augusta, Georgia. *Founder.*	1891
1905.	JAMES R. CHADWICK, A.M., M.D., Boston. *Founder.*	1905
1889.	M. CHARPENTIER, M.D., Paris, France.	
1893.	CHARLES J. CULLINGWORTH, M.D., London, England.	1908
1877.	JOHN C. DALTON, M.D., New York City.	1889
1877.	J. A. H. DEPAUL, M.D., Paris, France.	
1879.	EDWARD L. DUER, M.D., Bryn Mawr, Pa.	1917
1878.	J. MATTHEWS DUNCAN, M.D., London, England.	1890
1888.	ALEXANDER DUNLAP, M.D., Springfield, Ohio.	1894
1876.	THOMAS ADDIS EMMET, M.D., New York, *Founder.*	1919
1876.	JOSEPH A. EVE, M.D., Augusta, Georgia.	1886
1890.	HENRY D. FRY, M.D., Washington, D. C.	1918
1901.	HENRY J. GARRIGUES, M.D., Tryon, North Carolina.	1913
1889.	ROBERT P. HARRIS, M.D., Philadelphia.	1899
1888.	GRAILY HEWITT, M.D., London, England.	1893
1881.	J. BRAXTON HICKS, M.D., London, England.	1897
1902.	WILLIAM T. HOWARD, M.D., Baltimore, Md. *Founder.*	1907
1911.	JOSEPH E. JANVRIN, M.D., New York City.	1911
1876.	THOMAS KEITH, M.D., London, England.	1895
1888.	GILMAN KIMBALL, M.D., Lowell, Massachusetts.	1892
1891.	CHRISTIAN G. LEOPOLD, M.D., Dresden, Germany.	1912
1883.	RICHARD B. MAURY, M.D., Memphis, Tenn.	1918
1876.	ALFRED H. M'CLINTOCK, M.D., Dublin, Ireland.	1881
1892.	OTTAVIO MORISANI, M.D., Naples, Italy.	
1888.	EMIL NOEGGERATH, M.D., Wiesbaden, Germany. *Founder.*	1895

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Elected		Died
1891.	ROBERT OLSHAUSEN, Berlin, Germany.	1916
1877.	CHARLES PAJOT, M.D., Paris, France.	1899
1880.	CHAUNCEY D. PALMER, M.D., Cincinnati, Ohio.	1917
1901.	KARL PAWLIK, M.D., Prague, Hungary.	1914
1908.	J. PFANNENSTIEL, M.D., Kiel, Germany.	1909
1885.	W. S. PLAYFAIR, M.D., London, England.	1903
1891.	S. POZZI, M.D., Paris, France.	1918
1888.	Sir WILLIAM O. PRIESTLEY, LL.D., London, England.	1900
1907.	THADDEUS A. REAMY, M.D., Cincinnati, Ohio.	1909
1901.	M. SAENGER, M.D., Prague.	1903
1877.	F. W. VON SCANZONI, M.D., Würzburg, Bavaria.	
1896.	PAUL SEGOND, M.D., Paris, France.	
1876.	CARL SCHROEDER, M.D., Berlin, Germany.	1897
1876.	GUSTAV SIMON, M.D., Heidelberg, Germany.	1876
1888.	Sir ALEXANDER R. SIMPSON, Kt., Edinburgh, Scotland.	1916
1888.	D. HUMPHREYS STORER, M.D., Boston. *Founder.*	1891
1905.	R. STANSBURY SUTTON, M.D., Pittsburgh, Pa.	1906
1882.	LAWSON TAIT, Esq., Birmingham, England.	1899
1881.	S. TARNIER, M.D., Paris, France.	1897
1888.	ISAAC E. TAYLOR, M.D., New York City. *Founder.*	1889
1893.	T. GAILLARD THOMAS, M.D., New York City. *Founder.*	1903
1882.	J. KNOWSLEY THORNTON, Esq., London, England.	1904
1909.	ELY Van de WARKER, M.D., Syracuse, N. Y.	1910
1886.	Sir SPENCER WELLS, Bart., London, England.	1897
1881.	FRANZ von WINCKEL, M.D., Munich, Germany.	1912
1876.	MARMADUKE B. WRIGHT, M.D., Cincinnati.	1879

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ACTIVE FELLOWS

1915.—Adair, Fred L., M.A., M.D., F.A.C.S. Associate Professor of Obstetrics, University of Minnesota; Chief of Division of Obstetrics and Gynecology, Minneapolis City Hospital; Obstetrician and Gynecologist to St. Andrew's Hospital; Obstetrician to Swedish Hospital; Chief of Service, Obstetrics and Gynecology, Asbury Methodist Hospital; Captain in American Red Cross, Foreign Service, 1918 and 1919. 730 La Salle Building, Minneapolis, Minnesota.

1906.—Andrews, Frank T., A.M., M.D., F.A.C.S. Professor of Clinical Gynecology, Northwestern University Medical School; Gynecologist to Mercy and Wesley Hospitals and South Side Dispensary. 448 Barry Avenue, Chicago, Ill.

1909.—Anspach, Brooke M., M.D., F.A.C.S. Gynecologist and Obstetrician to the Philadelphia and Stetson Hospitals; Attending Gynecologist to Bryn Mawr Hospital; Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist, University Hospital; Volunteer Medical Service Corps. *Treasurer.* 1827 Spruce Street, Philadelphia, Penn.

1916.—Bailey, Harold Capron, M.D., F.A.C.S. Instructor in Obstetrics, Cornell University Medical College; Assistant Obstetrician to Bellevue Hospital; Assistant Obstetrician to Manhattan Maternity Hospital; Associate Gynecologist, Memorial Hospital. 22 East 68th St., New York.

1917.—Barrett, Channing Whitney, M.D., F.A.C.S. Professor of Gynecology and Clinical Gynecology and Head of the Division, University of Illinois Medical School; Professor of Gynecology, Chicago Polyclinic School; Attending Gynecologist and Head of the Department, Cook County Hospital; Attending Gynecologist Polyclinic, Henrotin, Memorial and West Side Hospitals. 4245 North Ashland Avenue, Chicago, Illinois.

1908.—Bissell, Dougal, M.D., F.A.C.S. Surgeon to the Woman's Hospital in the State of New York; Consulting Sur-

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geon to the State Hospital (Insane), Central Islip, L. I.; Medical Advisory Board, New York City; Volunteer Medical Service Corps. 219 West Seventy-ninth Street, New York.

1897.—BOVÉE, J. WESLEY, M.D., F.A.C.S. Professor of Gynecology, George Washington University; Gynecologist to Columbia and George Washington University Hospitals, and St. Elizabeth's Hospital for the Insane; 1st Lieut., M. R. C., 1917–18; Medical Aid to Governor for the District of Columbia. *President*, 1916. *Treasurer*, 1909–1915. *Council*. The Rochambeau, 815 Connecticut Avenue, Washington, D. C.

1909.—BRETTAUER, JOSEPH, M.D., F.A.C.S. Attending Gynecologist to Mt. Sinai Hospital, New York; Consulting Gynecologist to New Jersey State Hospital, Greystone Park, N. J., and to the United Hospital, Portchester, N. Y. *Council*, 1916. 1063 Madison Avenue, New York.

1905.—BROUN, LE ROY, B.S., M.D., F.A.C.S. Surgeon to Woman's Hospital in the State of New York; Consulting Surgeon to Manhattan State Hospital and Baptist Home. *Secretary*, 1909–1916. *Vice-president*, 1917. 148 West Seventy-seventh Street, New York.

1919.—BURNAM, CURTIS F., B.A., M.D., F.A.C.S. Associate of Howard A. Kelly at the Howard A. Kelly Hospital, Baltimore. 1418 Eutaw Place, Baltimore, Md.

1898.—BURRAGE, WALTER L., A.M., M.D. Formerly Gynecologist to St. Elizabeth's and the Carney Hospitals; Volunteer Medical Service Corps. 42 Eliot Street, Jamaica Plain, Boston, Mass.

1889.—BYFORD, HENRY T., M.D., F.A.C.S. Emeritus Professor of Gynecology, University of Illinois; Consulting Gynecologist, St. Luke's Hospital. *Vice-President*, 1918; Major in Medical Reserve Corps, 1917. Volunteer Medical Service Corps. Peoples Gas Building, Cor. Michigan Avenue and Adams St., Chicago, Ill.

1915.—CHALFANT, SIDNEY A., B.S., M.D., F.A.C.S. Gynecologist to Allegheny General Hospital, Pittsburgh; Columbia Hospital, Wilkinsburg. 7048 Jenkins Arcade Building, Pittsburgh, Penn.

1913.—CHILD, CHARLES GARDNER, JR., M.D. Professor of Obstetrics and Gynecology in the New York Polyclinic Medical School; Attending Gynecologist and Obstetrician to the New

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York Polyclinic Hospital; Attending Gynecologist to City Hospital. 163 East Seventy-first Street, New York.

1903.—CHIPMAN, WALTER WILLIAM, M.D., F.A.C.S., F.R.C.S. (Edin.). Professor of Obstetrics and Gynecology, McGill University; Gynecologist to the Royal Victoria Hospital; Obstetric Physician to the Montreal Maternity Hospital. *Council*, 1912. 285 Mountain Street, Montreal, Canada.

1903.—CLARK, JOHN G., M.D., F.A.C.S. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital; Consulting Gynecologist to the Jewish, Bryn Mawr, Germantown, Chestnut Hill and other hospitals; Chairman, Section Diseases of Women and Obstetrics, American Medical Association, 1910; Member of General Medical Board of the Council of National Defense. *Vice-President*, 1911. *President*, 1918. *Council*. 2017 Walnut Street, Philadelphia, Penn.

1916.—CLARK, SAMUEL M. D., B.Sc., M.D., F.A.C.S. Professor of Gynecology and Clinical Obstetrics, Tulane University; In charge of Department of Gynecology, Tulane University; Chief of Gynecological Division, Charity Hospital. New Orleans; Major, M. C; Chairman of Medical Council National Defense Louisiana, June, 1918; Foreign Service, France. 108 Baronne Street, New Orleans, La.

1909.—CROSSEN, HARRY STURGEON, M.D., F.A.C.S. Associate in Gynecology, Washington University Medical School and Associate Gynecologist to the Barnes Hospital; Gynecologist to St. Luke's and St. Louis Maternity Hospitals; Major, M. R. C.; Regimental Surgeon, 12th Engineers; Foreign Service, British Army, 1917 and 1919, and American Army, 1919. Metropolitan Building, St. Louis, Missouri.

1904.—CULLEN, THOMAS S., M.B., F.A.C.S. Professor of Clinical Gynecology, Johns Hopkins University; Visiting Gynecologist, Johns Hopkins Hospital; Consulting Gynecologist, Church Home and Infirmary; General Medical Board of the National Council of Defense. *Council*, 1914. 20 E. Eager St., Baltimore, Maryland.

1914.—CURTIS, ARTHUR H., B.S., M.D., F.A.C.S. Senior Gynecologist, St. Luke's Hospital; Clinical Professor of Gynecology, Northwestern University Medical School. *Council*, 1917; Captain, M. C., Foreign Service, France, 1919. 104 South Michigan Avenue, Chicago, Illinois.

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1920.—Danforth, William C., M.D., B.S., F.A.C.S. Senior Gynecologist and Obstetrician, Evanston Hospital; Associate Professor of Gynecology, Northwestern University. 1620 Hinman Avenue, Evanston, Illinois.

1920.—Davis, Carl Henry, A.B., M.D., F.A.C.S. Attending Obstetrician, Columbia Hospital; Attending Obstetrician and Gynecologist, Milwaukee County Hospital; Associate Professor Obstetrics and Gynecology, Marquette University School of Medicine; Lecturer in Obstetrics and Gynecology, Post-Graduate Medical Instruction, Extension Division, University of Wisconsin; Major, M. R. C. 141 Wisconsin Street, Milwaukee, Wisconsin.

1891.—Davis, Edward P., A.M., M.D., F.A.C.S. Professor of Obstetrics, Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to Philadelphia Hospital; Consultant to the Preston Retreat; Member (Founder) International Congress of Obstetrics and Gynecology; Honorary Member of Chicago Gynecological Society; Academy of Surgery, Bucharest; Honorary Member of the Ophthalmological Society of Egypt; Medical Society of Virginia; Member of College of Physicians of Philadelphia; Philadelphia Obstetrical Society; Medical Advisory Commission, Council of Defense; Medical Aide to Governor of Pennsylvania; President of Volunteer Medical Service Corps. *Council*, 1896–1899. *Vice-President*, 1904. *President*, 1910. *Council*, 1911–1914. 250 South Twenty-first Street, Philadelphia, Penn.

1918.—De Lee, Joseph Bolivar, A.M., M.D., F.A.C.S. Professor of Obstetrics, Northwestern University Medical School; Obstetrician to the Chicago Lying-in Hospital and Dispensary; Attending Obstetrician to Mercy Hospital; Consulting Obstetrician to Provident and Evanston Hospitals; Volunteer Medical Service Corps. 5028 Ellis Avenue, Chicago, Ill.

1892.—Dickinson, Robert L., M.D., F.A.C.S. Senior Gynecologist and Obstetrician, Brooklyn Hospital; Clinical Professor of Gynecology, Long Island College Hospital; Consulting Obstetrician, Methodist-Episcopal Hospital; Assistant Chief, Medical Section, Council National Defense, 1917–1918; Lt. Col. Medical Advisor to and member of General Staff, Washington, 1918–1919. *President*, 1920. *Vice-President*, 1916. 438 West 116th Street, New York.

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1893.—EDGAR, JAMES CLIFTON, Ph.B., A.M., M.D., F.A.C.S. Professor of Obstetrics and Clinical Midwifery, Cornell University Medical College of New York; Attending Surgeon to the Manhattan Maternity Hospital; Attending Obstetrician to Bellevue Hospital; Consulting Obstetrician to the New York Maternity, the Jewish Maternity, and the Greenwich (Conn.) Hospitals. *Vice-President,* 1907. 28 West Fifty-sixth Street, New York.

1907.—EHRENFEST, HUGO, M.D. Professor of Obstetrics and Gynecology, St. Louis University; Physician-in-Chief, St. Louis Obstetric Dispensary; Gynecologist, Jewish Hospital; Visiting Gynecologist, St. Louis City Hospital; Volunteer Medical Service Corps. 4333 McPherson Avenue, St. Louis, Missouri.

1904.—FINDLEY, PALMER, B.S., M.D., F.A.C.S. *Council,* 1913; Medical Director, Detention Home for Women. 3602 Lincoln Boulevard, Omaha, Nebraska.

1913.—FOULKROD, COLLIN, M.D. Obstetrician to the Presbyterian Hospital in Philadelphia; Volunteer Medical Service Corps, Council of National Defense. 4005 Chestnut St., Philadelphia, Penn.

1912.—FRANK, ROBERT TILDEN, B.A., M.A., M.D. Formerly Associate Gynecologist, Mount Sinai Hospital; Major, M. C., Foreign Service, 1918. National State Bank Building, Boulder, Colorado.

1904.—GELLHORN, GEORGE, M.D., F.A.C.S. Associate in Clinical Gynecology, Washington University; Gynecologist to St. Luke's Hospital and Barnard Free Skin and Cancer Hospital; Visiting Gynecologist to St. Louis City Hospital; Assistant Gynecologist to Barnes Hospital; Consulting Obstetrician to St. Louis Maternity Hospital; Consulting Gynecologist to St. John's Hospital; Fellow of Deutsche Gesellschaft für Gynäkologie; Non-resident Member of Gynecological Society of Berlin; Honorary Member of Chicago Gynecological Society. *Vice-President,* 1913 and 1916. 713 Metropolitan Building, St. Louis, Missouri.

1891.—GOFFE, J. RIDDLE, Ph.B., Ph.M., A.M., M.D., F.A.C.S. President of the Seventh International Congress for Obstetrics and Gynecology; Honorary Fellow, Société Belge de Gynecology

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et Obstétrique; Professor of Gynecology, New York Polyclinic Medical School and Hospital, and Dartmouth Medical College; Consulting Surgeon to the Woman's Hospital in the State of New York; Consulting Gynecologist to New York City Hospital, to St. Joseph's Hospital, Yonkers, N. Y., to Mt. Vernon Hospital, Mt. Vernon, N. Y., and to the Lawrence Hospital, Bronxville. Volunteer Medical Service Corps. *Council*, 1896. *Secretary*, 1897–1908. *President*, 1909. *Council*, 1910–1913. Residence, 123 East Fifty-third Street; Office, 38 West Fifty-ninth Street, New York.

1911.—Goodall, James R., B.A., M.D., C.M., D.Sc. Assistant Professor of Gynecology and Lecturer on Obstetrics, McGill University; Assistant Obstetric Physician to the Montreal Maternity Hospital; Consulting Gynecologist to the General Hospital, Saranac, N. Y., and Alice Hyde Hospital, Malone, N. Y.; Consulting Gynceologist to the Herschel Institute, Montreal; Major, Canadian Army Medical Corps, 1914–1919; Chief Medical Officer, Commanding 5th Mounted Rifles; wounded, 1916. 377 Mountain Street, Montreal, Canada.

1913.—Graves, William P., A.B., M.D., F.A.C.S. Surgeon-in-Chief to the Free Hospital for Women, Brookline; Professor of Gynecology, Harvard Medical School; Consulting Gynecologist, Boston Lying-in Hospital. *Council*, 1919. 244 Marlborough Street, Boston, Mass.

1895.—Harris, Philander A., M.D., F.A.C.S. Gynecologist and Obstetrician to the Paterson General Hospital; Consulting Gynecologist to the Passaic General Hospital, Passaic, N. J.; the Miriam Barnert Hospital, Paterson, N. J.; the Alexander Lynn Hospital, Sussex, N. J., and to the New Jersey State Hospital; Corresponding Member of the Obstetrical and Gynecological Society of Paris, France (1895); First Vice-President of the American Medical Association (1913); Ex-President of the Society of Surgeons of New Jersey; President of the New Jersey Medical Society. 26 Church Street, Paterson, N. J.

1913.—Heaney, Noble Sproat, A.B., M.D., F.A.C.S. Assistant Professor of Obstetrics and Gynecology in Rush Medical College; Associate Attending Obstetrician and Gynecologist to the Presbyterian Hospital. 104 South Michigan Avenue, Chicago, Illinois.

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1891.—HIRST, BARTON COOKE, A.B., M.D., LL.D., F.A.C.S. Professor of Obstetrics, University of Pennsylvania; Consulting Surgeon, Newport and Pottstown Hospitals; Gynecologist to the Howard and Orthopædic Hospitals; Consulting Obstetrician to the Lying-in Charity, Preston Retreat. 1821 Spruce Street, Philadelphia, Penn.

1916.—HOLDEN, FREDERICK CLARK, M.D., F.A.C.S. Professor of Gynecology, New York University and Bellevue Medical College; Gynecologist to Bellevue Hospital. 13 East Sixty-fifth Street, New York.

1918.—HOLMES, RUDOLPH WIESER, M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology, Rush Medical College; Attenting Obstetrician, Augustana and Passavant Memorial Hospitals; Chief, Medical Section, Chicago Division, American Protective League. 30 North Michigan Avenue, Chicago, Ill.

1913.—HUGGINS, RALEIGH R., M.D., F.A.C.S. Gynecologist to St. Francis' Hospital; Professor of Gynecology, University of Pittsburgh. 1018 Westinghouse Building, Pittsburgh, Penn.

1916.—HUNNER, GUY LE ROY, B.Sc., M.D., D.Sc., F.A.C.S. Lecturer in Clinical Gynecology, Johns Hopkins University. 2305 St. Paul Street, Baltimore, Md.

1916.—HUTCHINS, HENRY TALBOT, A.B., M.D., F.A.C.S. Surgeon, Massachusetts Women's Hospital, Boston. Gynecologist, The Children's Hospital, Boston; Consulting Gynecologist, Frost Hospital, Chelsea, and Memorial Hospital, Pawtucket, R. I.; Major, M. C., 1918–1919. 520 Commonwealth Avenue, Boston, Mass., Residence 130 Dudley Road, Newton Centre, Mass.

1920.—KEENE, FLOYD E., M.D., F.A.C.S. Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist, University of Pennsylvania Hospital; Gynecologist, Chestnut Hill Hospital; Consulting Gynecologist, Abington Memorial Hospital, Philadelphia; Major, M. C., 1917–1919; Foreign Service, France, 1918 and 1919. Thirty-seventh and Chestnut Streets, Philadelphia, Penn.

1887.—KELLY, HOWARD ATWOOD, B.A., M.D., LL.D., F.A.C.S., F.R.C.S. (Edinburgh). Professor Emeritus of Gynecology, Johns Hopkins University; Honorary Consulting Gynecologist to the Johns Hopkins Hospital; Honorary Member,

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Royal Medical Society of Edinburgh; Honorary Member, Italian Society of Obstetrics and Gynecology, Rome; Honorary Member, Society of Gynecology and Obstetrics, Berlin; Member of Society of Obstetrics, Leipzig; Honorary Fellow, Edinburgh Obstetrical Society; Honorary Fellow, Royal Academy of Medicine, Ireland; Honorary Fellow, Glasgow Obstetrical and Gynecological Society; Corresponding Member, Society of Obstetrics and Gynecology, Paris; Corresponding Member, Society of Surgery, Paris; Corresponding Member, Royal Society of Physicians, Vienna; Fellow, British Gynecological Society; Member, French Urological Association, Paris; Honorary Member, Society of Gynecology and Obstetrics, Belgium; Honorary Member, Peruvian Surgical Society, 1920; Volunteer Medical Service Corps. *Vice-President*, 1899 and 1906. *President*, 1912. *Council*, 1913–1915. 1418 Eutaw Place, Baltimore, Md.

1917.—KING, JAMES E., M.D., F.A.C.S. Professor of Clinical Gynecology, University of Buffalo; Attending Gynecologist, Buffalo General; Gynecologist-in-Chief, Buffalo City Hospital. Member Royal Society Medicine, London. 1248 Main Street, Buffalo, New York.

1892.—KIRKLEY, CYRUS A., M.D., F.A.C.S. Volunteer Medical Service Corps. 432 South Serrano Avenue, Los Angeles, California.

1918.—KOSMAK, GEORGE W., A.B., M.D., F.A.C.S. Attending Surgeon to the Lying-in Hospital, New York. Editor of American Journal of Obstetrics and Gynecology. 23 East Ninety-third Street, New York.

1891.—KRUG, FLORIAN, M.D. Consulting Gynecologist to the Lenox Hill Hospital. 616 Madison Avenue, New York.

1913.—LITTLE, HERBERT M., M.D., F.A.C.S. Assistant Professor of Obstetrics and Lecturer on Gynecology, McGill University; Assistant Accoucheur, Montreal Maternity Hospital; Assistant Gynecologist, Montreal General Hospital; with Canadian Expeditionary Forces in France, 1915, 1916, and 1917; Captain, Canadian Army Medical Corps, 1914–1918. 285 Stanley Street, Montreal, Canada.

1916.—LITZENBERG, JENNINGS CRAWFORD, B.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Minnesota; Chief of Department of Obstetrics and Gyne-

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cology; Chief of Staff, Out-patient Department, University of Minnesota Hospital; Attending Obstetrician in Northwestern and St. Mary's Hospitals. *Vice-President*, 1920. Donaldson Building, Minneapolis, Minn.

1916.—LYNCH, FRANK WORTHINGTON, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of California; Director of Woman's Clinic, University Hospital. 2511 Broadway, San Francisco, Cal.

1913.—MCGLINN, JOHN A., M.D., M.S. Associate Professor of Gynecology in the Post-Graduate School of the University of Pennsylvania; Gynecologist to St. Agnes' Hospital; Gynecologist and Obstetrician to Philadelphia General Hospital; Gynecologist to Medico-Chirurgical Hospital; Gynecologist to Polyclinic Hospital; Obstetrician to St. Vincent's Maternity Hospital; Consulting Gynecologist to St. Francis' Convalescent Home; Commander (M. C.) U. S. N. R. F.; formerly Chief of Staff and Operating Surgeon of Naval Hospital, League Island and U. S. Hospital Ship "Comfort;" Service, May, 1917, to January, 1920. 113 South Twentieth Street, Philadelphia, Penna.

1892.—MCLEAN, MALCOLM, M.D. Surgeon to St. Andrew's Infirmary for Women; Consulting Gynecologist to Randall's Island Hospitals. *Vice-President*, 1900. 40 E. Forty-first Street, New York.

1916.—MCMURTRY, LEWIS SAMUEL, M.D., LL.D., F.A.C.S. President of Medical Faculty and Professor of Abdominal Surgery and Gynecology, University of Louisville; Surgeon to Louisville City Hospital; Surgeon to John N. Norton Memorial Hospital; 1st Lieut., Medical Reserve Corps; Medical Aide to the Governor of Kentucky. The Atherton, Louisville, Ky.

1901.—MANTON, WALTER PORTER, M.D., F.A.C.S. Director and Professor of Department of Obstetrics, Detroit College of Medicine and Surgery; Gynecologist to Harper Hospital and to the Eastern and Northern Michigan State Hospitals; Consulting Gynecologist to St. Joseph's Retreat; Consulting Director, Maternity Department of Herman Kiefe Hospital (Municipal); Formerly Visiting Obstetrician and President of the Medical Board, Woman's Hospital and Infant's Home; President, Wayne County Medical Society, 1908–1909; Chairman, Section on Obstetrics and Diseases of Women, American Medical Association, 1908–1909; Fellow of the Royal Society of Medicine. 32 Adams Avenue, Detroit, Mich.

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1908.—MARTIN, FRANKLIN H., M.D., F.A.C.S. Professor of Gynecology, Post-Graduate Medical School of Chicago; Secretary-General, American College of Surgeons and Clinical Congress of the American College of Surgeons; Editor, Surgery, Gynecology and Obstetrics; Member of the Advisory Commission and Chairman of the General Medical Board of the Council of National Defense; President, International Association of Gynecologists and Obstetricians; Colonel, Medical Reserve Corps, United States Army; Chairman, Committee on Medicine and Sanitation, Council of National Defense. *President*, 1919. *Council*, 1920. 30 North Michigan Avenue, Chicago, Ill.

1916.—MILLER, CHARLES JEFFERSON, M.D., F.A.C.S. Professor of Obstetrics and Clinical Gynecology, Tulane University Medical School; Chief of Division of Obstetrics and Gynecology, Charity Hospital; Medical Aide to the Governor of Louisiana; Major, M. R. C.; Member of the General Medical Advisory Board of the Council of National Defense. *Council*, 1919. 124 Baronne St., New Orleans, La.

1909.—MILLER, GIDEON BROWN, B.Sc., M.D., F.A.C.S. Attending Gynecologist to the Emergency Hospital, the Garfield Hospital, and to the Columbia Hospital; Clinical Professor of Gynecology in the George Washington University. *Council*, 1920. 1730 K. Street, N. W., Washington, D. C.

1894.—MONTGOMERY, EDWARD E., A.M., M.D., LL.D., F.A.C.S. Professor of Gynecology, Jefferson Medical College; Gynecologist to Jefferson Medical College and to St. Joseph's Hospitals. *Vice-President*, 1919. 1426 Spruce Street, Philadelphia, Pa.

1912.—MORLEY, WILLIAM HORACE, Ph.B., M.D., F.A.C.S. Formerly director of Obstetrics, Detroit General Hospital; Consulting Obstetrician to the House of Providence Hospital; Consulting Pathologist to the Woman's Hospital and Infant's Home; Obstetrician-in-Chief to the Hanna Schloss Dispensary; Captain, M. R. C., 1917; Vice-Chairman Michigan State Committee, Council National Defense; Volunteer, Medical Service Corps. *Council*, 1917. R. F. D. No. 3, Pontiac, Michigan.

1920.—MORSE, ARTHUR H., A.B., M.D., F.A.C.S. Assistant Clinical Professor of Obstetrics and Gynecology, Yale School of Medicine; Assistant Obstetrician and Gynecologist, New Haven Hospital. 71 College Street, New Haven, Conn.

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1904.—Newell, Franklin Spilman, A.B., M.D., F.A.C.S. Obstetrician to Massachusetts General Hospital; Visiting Obstetrician, Boston Lying-in Hospital; Professor of Clinical Obstetrics, Harvard University. *Council*, 1912–1915. 443 Beacon Street, Boston, Mass.

1894.—Newman, Henry Parker, A.M., M.D., F.A.C.S. Professor Emeritus of Gynecology, University of Illinois College of Medicine, Chicago, and in the Chicago Polyclinic Medical School and Hospital; Formerly President of Chicago Post-Graduate Medical School and Chairman of Section on Obstetrics and Gynecology of American Medical Association; Founder and President of Marion Sims' Hospital, Chicago, 1895–1908; U. S. Secretary of Section on Abdominal Surgery and Gynecology, Pan-American Congress, 1901–08; A Founder-Member of the Congrés Periodique Internationale de Gynécologie et d'Obstétrique; Attending Surgeon and Gynecologist, Agnew Hospital and San Diego County Hospital. 1560 Eighth Street, San Diego, California.

1916.—Nicholson, William R., A.B., M.D. Gynecologist to Methodist and Polyclinic Hospitals; Obstetrician to Presbyterian Hospital; Associate in Obstetrics, University of Pennsylvania. 2023 Spruce Street, Philadelphia, Penn.

1902.—Noble, George Henry, M.D., F.A.C.S. Gynecologist to the Grady Hospital; Professor of Clinical Gynecology, Atlanta Medical College. *Vice-President*, 1913. 980 Peachtree Street, Atlanta, Georgia.

1914.—Norris, Charles C., M.D., F.A.C.S. Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist to the University of Pennsylvania; Consultant-Gynecologist and Obstetrician to The Henry Phipps Institute; Gynecologist to the Children's Hospital; Lieutenant, M. C., U. S. N. R.; Volunteer Medical Service Corps. Twenty-second and Chestnut Streets, Philadelphia, Pa.

1893.—Norris, Richard C., A.M., M.D. Assistant Professor of Obstetrics, Medical Department, University of Pennsylvania; Surgeon-in-Charge, Preston Retreat; Gynecologist to the Methodist Episcopal Hospital; Consulting Gynecologist, Friends' Asylum, Frankford; Consulting Obstetrician, Germantown Hospital; Consulting Obstetrician and Gynecologist, Philadelphia Hospital. 500 North Twentieth Street, Philadelphia, Penna.

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1897.—PETERSON, REUBEN, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist to the University of Michigan Hospital; Major, M. R. C., 1917–1919; Medical Aide to the Governor of Michigan; Chairman, Michigan Medical Section of Council of National Defense. *Vice-President*, 1906. *President*, 1911. *Council*, 1912–1915. Ann Arbor, Michigan.

1908.—POLAK, JOHN OSBORN, M.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Long Island College Hostal; Obstetrician and Gynecologist to the College Hospital; Consulting Obstetrician to the Methodist Episcopal Hospital; Gynecologist to the Jewish Hospital; Consulting Gynecologist to the Bushwick, Coney Island, Williamsburg, Deaconess', Zion and People's Hospitals; Consulting Obstetrician to Mary Hitchcock Hospital, Hanover, New Hampshire. 20 Livingston Street, Brooklyn, N. Y.

1917.—POMEROY, RALPH H., B.A., M.A., M.D., F.A.C.S. Associate Professor of Obstetrics and Gynecology, Long Island College Hospital; Consulting Obstetrician, St. John's, Bushwick and Kings County Hospitals; Senior Obstetrician Methodist Episcopal Hospital; Attending Gynecologist and Obstetrician, Brooklyn Hospital. 93 Remsen Street, Brooklyn, New York.

1915.—RAWLS, REGINALD M., A.B., M.D., F.A.C.S. Junior Surgeon to the Woman's Hospital, Secretary of New York Obstetrical Society. 350 West 88th Street, New York.

1916.—REED, CHARLES ALFRED LEE, A.M., M.D., F.A.C.S. Professor Emeritus of Gynecology, Medical Department, University of Cincinnati; Consulting Gynecologic Surgeon, Cincinnati General Hospital; Major, M. R. C., 1918–1919. 5 West Eighth Street, Cincinnati, Ohio.

1920.—RICHARDSON, EDWARD H., A.B., M.D., F.A.C.S. Associate in Clinical Gynecology, Johns Hopkins University; Gynecologist-in-charge Out-patient Gynecologic Clinic; Johns Hopkins Hospital; Visiting Gynecologist, Union Protestant Infirmary; Church Home and Infirmary; Hebrew Hospital; Hospital for Women of Maryland; Assistant Visiting Gynecologist, Johns Hopkins Hospital. 1200 North Charles Street, Baltimore, Md.

1896.—ROBB, HUNTER, M.D. 55 Bacon Street, Winchester, Mass.

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1917.—Russell, William Wood, A.M., M.D. Associate Professor of Gynecology and Assistant Gynecologist to Johns Hopkins Hospital; Gynecologist, Hospital for the Women of Maryland; Union Protestant Infirmary. 1208 Eutaw Place, Baltimore, Maryland.

1906.—Sampson, John A., A.M., M.D. Professor of Gynecology, Albany Medical College; Gynecologist to the Albany Hospital and South End Dispensary. *Council*, 1911. *Vice-President*, 1912. 180 Washington Avenue, Albany, New York.

1911.—Schenck, Benjamin R., A.B., M.D., F.A.C.S. Attending Gynecologist to Harper Hospital; Consulting Obstetrician to the Woman's Hospital; Associate Professor of Gynecology, Detroit College of Medicine and Surgery. *Council*, 1916. David Whitney Building, Detroit, Michigan. Temporary address, 12 Maple Avenue, Colorado Springs, Colo.

1914.—Schumann, Edward A., A.B., M.D. Lecturer on Obstetrics, Jefferson Medical College; Gynecologist and Obstetrician, Philadelphia General Hospital; Gynecologist, Frankford Hospital; Assistant Obstetrician, Jefferson Medical College Hospital; Consulting Gynecologist, Rush Hospital for Tuberculosis; Lieutenant, M. R. C., U. S. N. R., 1918–1919; Transport Service, 1918–1919. 124 South 18th Street, Philadelphia, Pa.

1907.—Simpson, Frank Farrow, A.B., M.D., F.A.C.S. Secretary-General of the Seventh International Congress for Obstetrics and Gynecology. Chairman of Section on Medical Industry, War Industries Board. *Vice-President*, 1915. *President*, 1917. Chief of Medical Section, Council of National Defense; Lt. Col., M. C., U. S. A. *Council*. 7048 Jenkins Arcade Building, Pittsburgh, Penn.

1914.—Slemons, Josiah Morris, A.B., A.M., M.D., F.A.C.S. Formerly Professor of Obstetrics and Gynecology, Yale University; Chief Obstetrician and Gynecologist, New Haven Hospital and Dispensary; Major, American Red Cross, 1917; 1917–1918; Major M. C., U. S. A., Foreign Service; Chief of the Surgical Service, Base Hospital No. 92, 1918–1919. *Council*. 1140 South Pasadena Avenue, Pasadena, California.

1905.—Smith, Richard R., M.D., F.A.C.S. Surgeon to Butterworth and Blodgett Hospitals; Lieut. Col. M. R. C., Foreign Service, France, 1917–1919. *Council*, 1911. *Vice-President*, 1912. Grand Rapids, Michigan.

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1918.—SPALDING, ALFRED B., A.B., M.D. Professor of Obstetrics and Gynecology, Stanford University School of Medicine; Executive of Division, Obstetrics and Gynecology, Lane Hospital. 2651 Green Street, San Francisco, Cal.

1905.—STONE, WILLIAM STEPHEN, A.B., M.D. Clinical Director of Cancer Research Memorial Hospital, New York. 162 East Sixty-third Street, New York.

1909.—STUDDIFORD, WILLIAM EMERY, B.A., M.A., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Columbia University, College of Physicians and Surgeons; Director of the Sloane Hospital for Women; Consulting Gynecologist to the Presbyterian Hospital, New York; Consulting Obstetrician to the New York Nursery and Child's Hospital, New York; Consulting Surgeon to the Franklin Hospital, Franklin, N. J. *Council*, 1914; *Vice-President*, 1919. 124 East 36th St., New York.

1906.—TAUSSIG, FREDERICK JOSEPH, A.B., M.D., F.A.C.S. Associate in Gynecology, Washington University; Gynecologist to Barnard Free Skin and Cancer Hospitals; Obstetrician to St. Louis Maternity Hospital; Gynecologist to the St. Louis City Hospital and St. John's Hospital. *Council*, 1915. 4506 Maryland Avenue, St. Louis, Missouri.

1905.—TAYLOR, HOWARD C., Ph.B., M.D., F.A.C.S. Attending Gynecologist, Roosevelt Hospital; Professor of Clinical Gynecology, Columbia University; Consulting Gynecologist, Sloane Hospital for Women, Tarrytown, Stamford, Greenwich, and Sharon (Conn.) Hospitals and Memorial Hospital, Pawtucket, R. I.; New York State Committee of the Medical Section of the Council of National Defense. *Vice-President*, 1914 and 1915. 32 West Fiftieth Street, New York.

1898.—THOMPSON, JOHN F., A.M., M.D., F.A.C.S. Professor of Diseases of Women, Medical School of Maine (now Bowdoin Medical College); Surgeon, Maine General Hospital; Consulting Gynecologist, Webber Hospital, Biddeford. *Vice-President*, 1911. 211 State Street, Portland, Maine.

1897.—VINEBERG, HIRAM N., M.D., F.A.C.S. Attending Gynecologist to Mt. Sinai Hospital; Gynecologist-in-Chief, Beth Moses Hospital; Consulting Gynecologist to the Montefiore Home for Chronic Invalids. 751 Madison Avenue, New York.

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1903.—WAKEFIELD, W. FRANCIS B., M.B., M.D.C.M., F.A.C.S. *Vice-President*, 1917. 1065 Sutter Street, San Francisco, Cal.

1909.—WARD, GEORGE GRAY, JR., M.D., F.A.C.S. Chief Surgeon of the Woman's Hospital, in the State of New York; Professor of Gynecology, Cornell University Medical College; Formerly Gynecologist to Bellevue Hospital; Consulting Gynecologist to New York Post-Graduate Hospital, Monmouth Memorial Hospital, Long Branch, N. J., the Italian Hospital and the Booth Memorial Hospital, New York City; Formerly Professor of Diseases of Women, New York Post-Graduate Hospital, New York; Volunteer Medical Service Corps. *Council*, 1913. *Secretary*. 48 East Fifty-second Street, New York.

1896.—WATKINS, THOMAS J., M.D., F.A.C.S. Professor of Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's Hospital, Chicago; Chairman of the Medical Advisory Board, St. Luke's Hospital. *Vice-President*, 1914. *President*, 1915. *Council*, 1916–1919. 104 S. Michigan Avenue, Chicago, Ill.

1915.—WATSON, BENJAMIN P., M.B., Ch.B., M.D., F.R.C.S., F.A.C.S. Professor of Obstetrics and Gynecology, University of Toronto; Obstetrician and Gynecologist-in-Chief, Toronto General Hospital; Captain, C. A. M. C.; served in England and Salonica with No. 4 Canadian General Hospital, 1915–1916. *Council*, 1919. 14 Madison Avenue, Toronto, Canada.

1898.—WEBSTER, J. CLARENCE, B.A., M.D. (Edin.), F.R.C.P.E., F.R.S.E., F.A.C.S. Professor of Obstetrics and Gynecology, Rush Medical College, University of Chicago; Gynecologist, Presbyterian and St. Joseph's Hospitals; Fellow of the Edinburgh Obstetrical Society; Corresponding Member of the Royal Academy of Palermo, Italy, and of the Italian Obstetrical and Gynecological Society. *Vice-President*. 920 Monroe Bldg., 104 South Michigan Avenue, Chicago, Ill.

1892.—WILLIAMS, J. WHITRIDGE, A.B., M.D., Sc.D., LL.D., F.A.C.S. Professor of Obstetrics, and Dean Medical Department of Johns Hopkins University; Obstetrician-in-Chief to the Johns Hopkins Hospital; Honorary President, Glasgow Gynecological and Obstetrical Society, 1910–12; President, American Association for the Prevention of Infant Mortality, 1913–1914; President, Medical and Chirurgical Faculty of Maryland, 1916; Honorary Fellow, Edinburgh Obstetrical

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Society, etc. *Council*, 1899. *Vice-President*, 1904. *President*, 1914. *Council*, 1915–1918. 107 East Chase Street, Baltimore, Maryland.

1917.—YOUNG, ERNEST BOYEN, A.B., M.D. Surgeon-in-Chief, Gynecological and Obstetrical Section, 5th Surgical Service, Boston City Hospital; Surgeon, Massachusetts Women's Hospital; Instructor, Gynecological Department, Harvard Medical School; Captain, M. R. C; Captain, Medical Reserve Corps, 1918–1919. 434 Marlborough Street, Boston, Mass.

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ACTIVE FELLOWS
CLASSIFIED

California

Kirkley, Cyrus A., 432 South Serrano Avenue, Los Angeles.
Lynch, Frank W., 2511 Broadway, San Francisco.
Newman, Henry Parker, 1560 Eighth Street, San Diego.
Slemons, Josiah Morris, 1140 Pasadena Avenue, Pasadena.
Spalding, Alfred B., 2651 Green Street, San Francisco.
Wakefield, W. Francis, 1065 Sutter Street, San Francisco.

Canada

Chipman, Walter William, 285 Mountain Street, Montreal.
Goodall, James R., 377 Mountain Street, Montreal.
Little, Herbert M., 285 Stanley Street, Montreal.
Watson, Benjamin P., 14 Madison Avenue, Toronto.

Colorado

Frank, Robert Tilden, Boulder.

Connecticut

Morse, Arthur H., 71 College St., New Haven.

District of Columbia

Bovée, J. Wesley, The Rochambeau, 815 Connecticut Avenue, Washington.
Miller, Gideon Brown, 1730 K Street, N. W., Washington.

Georgia

Noble, George Henry, 980 Peachtree Street, Atlanta.

Illinois

Andrews, Frank T., 448 Barry Avenue, Chicago.
Barrett, Channing Whitney, 4245 Ashland Avenue, Chicago.
Byford, Henry T., Michigan Avenue and Adams Street, Chicago.
Curtis, Arthur H., 104 South Michigan Avenue, Chicago.
Danforth, William C., 1620 Hinman Avenue, Evanston.
De Lee, Joseph B., 5028 Ellis Avenue, Chicago.

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HEANEY, NOBLE SPROAT, 104 South Michigan Avenue, Chicago.
HOLMES, RUDOLPH W., 30 North Michigan Avenue, Chicago.
MARTIN, FRANKLIN H., 30 North Michigan Avenue, Chicago.
WATKINS, THOMAS J., 104 South Michigan Avenue, Chicago.
WEBSTER, J. CLARENCE, 104 South Michigan Avenue, Chicago.

KENTUCKY

McMURTRY, LEWIS S., The Atherton, Louisville.

LOUISIANA

CLARK, SAMUEL M. D., 108 Baronne Street, New Orleans.
MILLER, CHARLES JEFFERSON, 124 Baronne Street, New Orleans.

MAINE

THOMPSON, JOHN F., 211 State Street, Portland.

MARYLAND

BURNAM, CURTIS F., 1418 Eutaw Place, Baltimore.
CULLEN, THOMAS S., 20 East Eager Street, Baltimore.
HUNNER, GUY L., 2305 St. Paul Street, Baltimore.
KELLY, HOWARD A., 1418 Eutaw Place, Baltimore.
RICHARDSON, EDWARD H., 1200 North Charles Street, Baltimore.
RUSSELL, WILLIAM WOOD, 1208 Eutaw Place, Baltimore.
WILLIAMS, J. WHITRIDGE, 107 East Chase Street, Baltimore.

MASSACHUSETTS

BURRAGE, WALTER L., 42 E. Eliot Street, Jamaica Plain, Boston.
GRAVES, WILLIAM P., 244 Marlborough Street, Boston.
HUTCHINS, HENRY TALBOT, 520 Commonwealth Avenue, Boston.
NEWELL, FRANKLIN SPILMAN, 443 Beacon Street, Boston.
ROBB, HUNTER, 55 Bacon Street, Winchester.
YOUNG, ERNEST BOYEN, 434 Marlborough Street, Boston.

MICHIGAN

MANTON, WALTER PORTER, 32 Adams Avenue, Detroit.
MORLEY, WILLIAM HORACE, R. F. D. 3, Pontiac.
PETERSON, REUBEN, Ann Arbor.
SCHENCK, BENJAMIN R., Broadmoor, Colorado Springs, Col.
SMITH, RICHARD R., Grand Rapids.

MINNESOTA

ADAIR, FRED L., 730 La Salle Building, Minneapolis.
LITZENBERG, JENNINGS C., Donaldson Building, Minneapolis.

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Missouri

Crossen, Harry Sturgeon, Metropolitan Building, St. Louis.
Ehrenfest, Hugo, 4333 McPherson Avenue, St. Louis.
Gellhorn, George, 713 Metropolitan Building, St. Louis.
Taussig, Frederick Joseph, 4506 Maryland Avenue, St. Louis.

Nebraska

Findley, Palmer, 3602 Lincoln Boulevard, Omaha.

New Jersey

Harris, Philander A., 26 Church Street, Paterson.

New York

Bailey, Harold C., 22 East Sixty-eighth Street, New York.
Bissell, Dougal, 219 West Seventy-ninth Street, New York.
Brettauer, Joseph, 1063 Madison Avenue, New York.
Broun, Le Roy, 148 West Seventy-seventh Street, New York.
Child, Charles Gardner, 163 East Seventy-first Street, New York.
Dickinson, Robert L., 438 West 116th Street, New York.
Edgar, James Clifton, 28 West Fifty-sixth Street, New York.
Goffe, J. Riddle, 123 East Fifty-third Street, New York.
Holden, Frederick C., 13 East Sixty-fifth Street, New York.
King, James E., 1248 Main Street, Buffalo.
Kosmak, George W., 23 East Ninety-third Street, New York.
Krug, Florian, 616 Madison Avenue, New York.
McLean, Malcolm, 40 East Forty-first Street, New York.
Polak, John Osborne, 20 Livingston Street, Brooklyn.
Pomeroy, Ralph H., 93 Remsen Street, Brooklyn.
Rawls, Reginald M., 350 West Eighty-eighth Street, New York.
Sampson, John A., 180 Washington Avenue, Albany.
Stone, William S., 162 East Sixty-third Street, New York.
Studdiford, William Emery, 124 East Thirty-sixth Street, New York.
Taylor, Howard C., 32 West Fiftieth Street, New York.
Vineberg, Hiram N., 751 Madison Avenue, New York.
Ward, George Gray, Jr., 48 East Fifty-second Street, New York.

Ohio

Reed, Charles A. L., 5 West Eighth Street, Cincinnati.

Pennsylvania

Anspach, Brooke M., 1827 Spruce Street, Philadelphia.
Chalfant, Sidney A., 7048 Jenkins Arcade Building, Pittsburgh.
Clark, John G., 2017 Walnut Street, Philadelphia.

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DAVIS, EDWARD P., 250 South Twenty-first Street, Philadelphia.
FOULKROD, COLLIN, 4005 Chestnut Street, Philadelphia.
HIRST, BARTON COOKE, 1821 Spruce Street, Philadelphia.
HUGGINS, RALEIGH R., 1018 Westinghouse Building, Pittsburgh.
KEENE, FLOYD E., Thirty-seventh and Chestnut Streets, Philadelphia.
McGLINN, JOHN A., 113 South Twentieth Street, Philadelphia.
MONTGOMERY EDWARD E., 1426 Spruce Street, Philadelphia.
NICHOLSON, WILLIAM R., 2023 Spruce Street, Philadelphia.
NORRIS, CHARLES C., Twenty-second and Chestnut Streets, Philadelphia.
NORRIS, RICHARD C., 500 North Twentieth Street, Philadelphia.
SCHUMANN, EDWARD A., 1823 Chestnut Street, Philadelphia.
SIMPSON, FRANK FARROW, 7048 Jenkins Arcade Building, Pittsburgh.

WISCONSIN

DAVIS, CARL HENRY, 141 Wisconsin Street, Milwaukee.

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ACTIVE FELLOWS

DECEASED

Elected		Died
Founder.	ATLEE, WASHINGTON L., M.D.	1877
Founder.	BARKER, FORDYCE, M.D., LL.D.	1891
1913.	BRICKNER, SAMUEL M., A.M., M.D.	1916
Founder.	BUCKINGHAM, CHARLES E., M.D.	1877
Founder.	BYFORD, WILLIAM H., M.D., LL.D.	1890
Founder.	BYRNE, JOHN, M.D., M.R.C.S.E.	1902
1888.	COLEMAN, JOHN SCOTT, M.D.	1892
1896.	CRAGIN, EDWIN B., A.B., A.M., M.D., F.A.C.S.	1918
Founder.	DRYSDALE, THOMAS M., A.M., M.D.	1904
1889.	DUDLEY, A. PALMER, M.D.	1905
1891.	EDEBOHLS, GEORGE M., A.M., M.D.	1908
Founder.	ENGELMANN, GEORGE J., A.M., M.D.	1903
1890.	ETHERIDGE, JAMES H., A.M., M.D.	1899
1902.	FREDERICK, CARLTON C., B.S., M.D.	1911
1909.	GARCEAU, EDGAR, M.D.	1913
Founder.	GOODELL, WILLIAM, A.M., M.D., LL.D.	1895
1887.	HANKS, HORACE TRACY, M.D., LL.D.	1900
1894.	HENROTIN, FERNAND, M.D.	1906
1892.	HOLMES, HORATIO R., M.D.	1896
1885.	HUNTER, JAMES B., M.D.	1889
1877.	JACKSON, A. REEVES, A.M., M.D.	1892
1889.	JAGGARD, W. W., M.D.	1896
Founder.	JENKS, EDWARD W., M.D., LL.D.	1903
1885.	JEWETT, CHARLES, A.M., M.D., Sc.D.	1911
1886.	JOHNSTONE, ARTHUR W., A.M., M.D.	1905
1892.	KEATING, JOHN M., M.D., LL.D.	1893
1886.	KING, ALBERT F. A., A.M., M.D., LL.D.	1915
1888.	KOLLOCK, CORNELIUS, A.M., M.D.	1897
1881.	LEE, CHARLES C., A.M., M.D., LL.D.	1893
Founder.	LUSK, WILLIAM T., A.M., M.D., LL.D.	1897
1892.	MacMONAGLE, BEVERLY, M.D.	1912
1891.	MOSELY, WILLIAM E., M.D., F.A.C.S.	1916
Founder.	MUNDÉ, PAUL F., M.D., LL.D.	1902
1890.	MURRAY, ROBERT A., M.D.	1909

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Elected		Died
Founder.	PARVIN, THEOPHILUS, M.D., LL.D.	1898
Founder.	PEASLEY, E. RANDOLPH, M.D., LL.D.	1880
1881.	POLK, WILLIAM M., M.D., LL.D., F.A.C.S.	1918
1892.	PRYOR, WILLIAM R., M.D.	1904
Founder.	SKENE, ALEXANDER J. C., M.D.	1900
Founder.	SMITH, ALBERT H., M.D.	1886
1891.	STRONG, CHARLES P., A.B., M.D.	1893
Founder.	TRASK, JAMES D., M.D.	1883
1891.	WATHEN, WILLIAM H., M.D.	1913
Founder.	WALLACE, ELLERSLIE, M.D.	1885
1902.	WELLS, BROOKS H., M.D., F.A.C.S.	1917
1916.	WERDER, XAVIER OSWALD, M.D., F.A.C.S.	1919
Founder.	WHITE, JAMES P., M.D.	1881
1887.	WILSON, ELWOOD, M.D.	1889
Founder.	WILSON, HENRY P. C., M.D.	1898

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ACTIVE FELLOWS

RESIGNED

Elected		Resigned
Founder.	BIXBY, GEORGE H., M.D.	1889
1896.	BOISE, EUGENE, A.B., M.D.	1918
1878.	BOZEMAN, NATHAN, M.D.	1886
1894.	BUCKMASTER, A. HARPER, M.D.	1908
1893.	CUSHING, ERNEST W., A.B., LL.D., M.D.	1916
1895.	EMMET, JOHN DUNCAN, M.D.	1909
1881.	FOSTER, FRANK P., M.D.	1895
1881.	GILLETTE, WALTER R., M.D.	1889
1877.	GOODMAN, JOHN, M.D.	1892
1890.	*GRANDIN, EGBERT H., M.D.	1913
1891.	*HARDEN, VIRGIL O., M.D.	1894
Founder.	INGHAM, JAMES V., M.D.	1889
1895.	JARMAN, GEORGE W., A.M., M.D.	1917
Founder.	LYMAN, GEORGE H., M.D.	1885
1891.	MacLAREN, ARCHIBALD, M.D.	1903
1895.	PENROSE, CHARLES B., A.M., Ph.D., M.D.	1912
Founder.	PENROSE, RICHARD A. F., M.D., LL.D.	1886
1877.	REYNOLDS, JOHN P., M.D.	1896
1892.	RICHIE, PARK, M.D.	1894
1881.	*SAWYER, EDWARD W., A.M., M.D.	1899
1879.	SCOTT, JOHN, M.D., F.R.C.S.I.	1886
1886.	*SIMS, H. MARION, M.D.	1901
Founder.	SIMS, J. MARION, M.D., LL.D.	1883
Founder	SINCLAIR, ALEXANDER D., M.D.	1882
1892.	SMITH, A. LAPTHORN, M.D., M.R.C.S.	1912
1898.	STONE, ISAAC S., M.D.	1918
1891.	*TUTTLE, GEORGE M., A.B., M.D.	1896

* Due to requirements of Constitution and By-Laws

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MINUTES OF THE PROCEEDINGS

AT THE

FORTY-FIFTH ANNUAL MEETING

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

HELD AT

CHICAGO, ILLINOIS

MAY 24, 25 AND 26, 1920

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FORTY-FIFTH ANNUAL MEETING

CHICAGO, ILLINOIS, May 24, 25 and 26, 1920

The following Fellows were present:

Adair, Fred L.,	Minneapolis, Minn.
Andrews, Frank T.,	Chicago, Ill.
Anspach, Brooke M.,	Philadelphia, Pa.
Bailey, Harold C.,	New York.
Barrett, Channing W.,	Chicago, Ill.
Bovée, J. Wesley,	Washington, D. C.
Brettauer, Joseph,	New York.
Burnam, Curtis F.,	Baltimore, Md.
Byford, Henry T.,	Chicago, Ill.
Chalfant, Sidney A.,	Pittsburgh, Pa.
Child, Charles G., Jr.,	New York.
Clark, John G.,	Philadelphia, Pa.
Crossen, Henry S.,	St. Louis, Mo.
Curtis, Arthur H.,	Chicago, Ill.
Davis, Edward P.,	Philadelphia, Pa.
De Lee, Joseph B.,	Chicago, Ill.
Dickinson, Robert L.,	New York.
Ehrenfest, Hugo,	St. Louis, Mo.
Frank, Robert T.,	New York.
Gellhorn, George,	St. Louis, Mo.
Graves, William P.,	Boston, Mass.
Heaney, N. Sproat,	Chicago, Ill.
Holmes, Rudolph W.,	Chicago, Ill.
King, James E.	Buffalo, N. Y.
Kosmak, George W.,	New York.
Little, Herbert M.,	Montreal, Can.
Litzenberg, Jennings C.,	Minneapolis, Minn.
McGlinn, John A.,	Philadelphia, Pa.
McMurtry, Lewis S.,	Louisville, Ky.

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Martin, Franklin H.,	Chicago, Ill.
Miller, Charles Jefferson,	New Orleans, La.
Morley, William H.,	Detroit, Mich.
Peterson, Reuben,	Ann Arbor, Mich.
Polak, John O.,	Brooklyn, N. Y.
Pomeroy, Ralph H.,	Brooklyn, N. Y.
Smith, Richard R.,	Grand Rapids, Mich.
Stone, William S.,	New York.
Taussig, Frederick J.,	St. Louis, Mo.
Taylor, Howard C.,	New York.
Thompson, John F.,	Portland, Me.
Vineberg, Hiram N.,	New York.
Wakefield, W. Francis B.,	San Francisco, Cal.
Ward, George Gray, Jr.,	New York.
Watkins, Thomas J.,	Chicago, Ill.
Watson, Benjamin P.,	Toronto, Can.
Williams, J. Whitridge,	Baltimore, Md.
Young, Ernest B.,	Boston, Mass.

The following Honorary Fellows were present:

Boldt, Herman J.
Dudley, E. C.
Noble, Charles P.
Reynolds, Edward

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First Day, *Monday, May 24,* 1920

Morning Session. The Society met in the Florentine Room of the Congress Hotel, Chicago, and was called to order at 10 A.M. by the President, Dr. Robert L. Dickinson, New York.

The Secretary called the roll.

The next order of business being the reception of guests, the Secretary announced that those gentlemen who had accepted the invitation to contribute papers and discussions were the official guests of the Society. They are: Dr. Charles B. Reed, Chicago; Dr. Lilian K. P. Farrar, New York City; Dr. Rollin T. Woodyatt, Chicago; Dr. Thomas Watts Eden, London, England; Dr. Harry E. Mock, Chicago; Dr. I. C. Rubin, New York City; Dr. Emil Ries, Chicago; Dr. Carl Henry Davis, Milwaukee; Dr. William C. Danforth, Chicago; and Dr. William A. Coventry, Chicago.

Upon motions made by several Fellows the following gentlemen were also made guests and invited to participate in the discussions: Dr. A. C. Beck, Brooklyn, N. Y.; Dr. William Kerwin, St. Louis, Mo.; Dr. R. L. Smith, Los Angeles, Cal.; Dr. W. G. Wallace, Montreal, Can.; Dr. J. A. R. Newman, Colorado Springs, Col.; Dr. H. O. Jones, Chicago; Dr. G. S. Hanes, Louisville, Ky.; Dr. Louis W. Frank, Louisville, Ky.; Dr. E. Gustav Zinke, Cincinnati, Ohio; Dr. Arthur B. Supple, Chicago; Dr. Philip S. Doane, Chicago; and all the members of the Chicago Gynecological Society.

The President then introduced Dr. Henry T. Byford, of Chicago, who delivered the address of welcome.

Address of Welcome

Mr. President and Fellows of the American Gynecological Society: I regret that we have not a representative of our municipal government here to add a bit of old-fashioned solemnity and variety to the occasion and offer you the freedom of our city, but the Committee of Arrangements does not consider our city government sufficiently old-fashioned and solemn, and so have put the task on me.

As a substitute for the municipal address I will read a para-

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graph of pioneer history by Edward P. Whipple: "When Chicago was the habitation of a small number of men only, a steamboat was seen in the distance, and the report was that it was a cargo of women who were coming to the desolate place for the purpose of being married to the forlorn men. Every bachelor hastened to the pier with a telescope in one hand and a speaking trumpet in the other. By the aid of the telescope each lover selected his mate and by the aid of the speaking trumpet each lover made his proposal. In honor of the women who made the venturesome voyage the infant city was named 'She Cargo.'" This was our pregynecologic state. History also tells us that the women were all from Boston, where the natives cannot pronounce their R's, so they called it "Shecahgo." The Bostonians pronounce it that way today and wonder why we, out here, cannot pronounce our own name. We think that we can, but the trouble is that we cannot spell it. There are many who believe that the city deserves a better name. There are many who believe that Columbus made the mistake of his life when he sailed for the Indies; that if he had sailed for the Gulf of St. Lawrence and through the Great Lakes and landed at Chicago instead of San Salvador we would have named the city after him. This is, I believe, about what the missing municipal orator would have said.

Speaking for the medical profession I can solemnly assure you that this is a great day for Chicago. It is not often that a society ranking with this one meets here. The American Gynecogical Society was born full grown forty-four years ago and in its very first year had more great men working in it than any similar society. Its *Transactions* have always been read by leading gynecologists of Europe in order to keep themselves up to date. And now that you are here, in the wild and woolly west, we hardly known how best to honor you.

There is only one damper on the spirit of our welcome: In looking out of your windows this morning upon our great expanse of water over the way you undoubtedly felt like saying what we say here every day, "Water, water, everywhere, but not a drop to drink." This is not a quotation from Coleridge—it is an act of Congress, a penalty for electing to Congress a lot of orators who are afraid to follow their own inclinations—except their inclinations to talk. The indications are, however, that we will

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have a successful meeting, probably the most quiet and orderly one in many years. Times have changed somewhat since I was admitted to Fellowship in the latter half of the last century. A kinder, more courteous and dignified set of men than those brainy pioneers of gynecologic surgery never sat together. My association with them is one of the most enjoyable and, I might say, one of the dearest recollections of my professional life. In those days we had plenty of the virus that spreads the contagion of laughter and postprandial relaxation, but they would not inoculate themselves. That was the one thing they were too old to learn. Today we average a younger set of Fellows and believe, more or less, in the contagion, but we cannot get the virus.

It has heretofore been incumbent upon the orator in welcoming this Society to do a little gentle boasting for his city. We have changed all that in Chicago; we now tell the plain truth. I was not at our last meeting, but in Philadelphia, two years ago, we were told that the city had a "shrinelike atmosphere," and that there was a "sanctity about the place that filled the imagination with visions of a glorious past." That was very good for the past—almost as good as was expected of them. But coming down to modern times they told us that they were not slow in Philadelphia; they told us that they were making a home every twenty minutes, a baby every thirteen minutes and performing a surgical operation every ten minutes. Now that was very good for two years ago, and in a city with such a past. But today in Chicago a baby is born every thirteen seconds and a bandit every minute; a murder is committed every day and a child run over by a taxicab every other day! Yet we do not boast of it; we just mention it, and forget it.

However, there are a few plain truths about Chicago that should be mentioned on a great occasion like this. Such an opportunity might not present itself soon again. The last census has proclaimed Chicago the second largest city in America and the third largest city in the world; and when it has annexed a few more outlying suburbs it then will be the largest city in the world. It is the greatest medical center in the world. We have the organization and the organ of the largest medical association in the world, the American Medical Association. We have the organization, the organ and the organist of the greatest surgical body in the world, the American College of

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Surgeons. We have two leading post-graduate medical schools, three leading graduate schools, four leading general hospitals, five leading medical societies, six leading clinics, seven leading medical journals, eight leading—I forget just what the eight was leading me to, but whatever it is, if we have not got it on hand we are prepared to produce it to order while you wait. That is the Chicago idea. We have not quite all of the journals ready yet, but if you will wait thirty days we will produce them.

I will not boast of our municipal government. I will not tell the truth about it, except to say that when it has issued all of the bonds it expects to Chicago will have more money in circulation than any other city in the world. I am sorry the Mayor is not here to show the visiting doctors what a well-regulated municipal organization he has—the insane asylum. The asylum is run just like the city. Some time ago an official was showing some visiting doctors what a well-regulated institution they had, and, coming finally upon a large man in one of the padded cells, he said: "This, gentlemen, is a sad case of delusion. This man thinks he is Napoleon, which, of course, is absurd, because I am Napoleon."

To show you that I am telling only the plain truth I will finish telling about these seven medical journals I claimed for Chicago. We have the *Journal of the American Medical Association; Surgery, Gynecology and Obstetrics;* the *Archives of Internal Medicine;* the *American Journal of the Diseases of Children;* the *Archives of Neurology and Psychiatry;* the *Archives of Dermatology and Syphilology;* and volume No. 1 of the seventh journal, the *Archives of Surgery*, will appear the first of July. This is authentic.

Our program, as you see, gives us quite a little time for recreation and sightseeing, and we feel it our duty to warn you while here to keep your hand on your pocketbook, to stay indoors after dark and to avoid the street-crossings and policemen by day. Stick to the meetings. They are safe. The chairman of the Committee of Arrangements, who is a golfer, has planned to keep us at the golf clubs as much of the time as possible, for he says that you can dodge a golf ball, but you cannot dodge a yellow taxicab. There is only one damper on the spirit of our golf, the federal officer, and I hope that the committee has arranged to have none of them prowling about the country clubs while you are here.

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Now, gentlemen, I have told you what kind of a place you have come to, and in the name of our city and the local medical profession I authorize you to regard everything in sight as your own to command and to enjoy.

Response to the Address of Welcome by Dr. Edward P. Davis

Mr. President and Fellows of the American Gynecological Society: It is really interesting to have Dr. Byford supply to us the missing archives of one of the earliest meetings of the American Gynecological Society when these ladies from Boston came to the city. It will fill a gap in our historic records that is very acceptable.

When we learned that the Council had so wisely chosen Chicago as the place of meeting we were somewhat in the condition of a man whose life and career has been identified with the state of Illinois and largely with the city of Chicago. I refer to Abraham Lincoln. Although born in Kentucky, Illinois may justly claim him as her representative.

He was engaged in a very active canvass for Congressman, and his opponent was a preacher. Lincoln had never met or heard the man and determined so to do, and went to his town, and on a Sunday evening entered his church and sat quietly in the rear to listen to the preacher. After the preacher had combed his sheep and chastised the goats he caught sight of Lincoln and was determined to have a roundup with him. He thought he would make Lincoln look ridiculous. So he said: "Brethren and sisters, I wish that all those of you who feel that you are sure where you are going after this earthly pilgrimage has ended will kindly rise." The sheep rose, then the timid goats, and a few with Lincoln remained seated. The preacher said, "I observe a stranger in our midst, and I am sure our hearts yearn for him, and we would like to know something concerning him and where he is going." Lincoln rose and said: "Sir, I entered this house of God under your ministrations, with the hope that I might sit quietly and unobservedly here and share with you in your devotion; but since you have asked me where I am going, I have no hesitation in answering, 'I am going to Congress.'" And he did.

When we received an invitation to come here we were not

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aware of coming to the Congress Hotel; we were like Lincoln, we were sure we were coming to the city of Chicago.

I question whether we realize the part which this city played in the medical history of our country. The very sight of the Fellow who has so graciously and charmingly welcomed us brings a personal sense of obligation, for I had the pleasure of being a pupil of his father.

As we look back to the men of a generation ago and remember everything that has contributed to make Chicago what it is, we also remember that some of the first ideas of enlargement of the medical course originated here. When we consider the water of the lake here is fresh water which men drink, we have some idea of what this city has stood for in the past.

The Secretary announced that he had received telegrams and letters of regret from Drs. Barton Cooke Hirst, Reginald M. Rawls, Le Roy Broun, Thomas S. Cullen, W. W. Chipman, Walter P. Manton, J. Clarence Webster and Gideon Brown Miller.

THE PRESIDENT.—It is the duty of your President at the first session to announce the Nominating Committee. This committee consists of the last five ex-Presidents of the Society and of three Active Fellows appointed by the President. The committee this year will consist of Drs. Franklin H. Martin, John G. Clark, Frank S. Simpson, J. Wesley Bovée, Thomas J. Watkins, Rueben Peterson, George Gellhorn, and William P. Graves.

The following announcements were made:

On Monday, May 24, the President, Dr. Robert L. Dickinson, will entertain the Society and its guests at luncheon at the Congress Hotel, in the Francis the First Room, at one o'clock.

A subscription dinner of the Society, at which the guests reading papers are invited, will be held at the South Shore Country Club at seven o'clock.

On Tuesday, May 25, the Chicago Fellows will entertain the Society and its guests at luncheon at the South Shore Country Club at one o'clock. The afternoon will be devoted to recreation, golf, tennis, etc.

The Chicago Gynecological Society will entertain the Society and its guests at dinner at the Congress Hotel at half-past six o'clock.

The joint meeting of the two societies for the Sociological Program will be held in the Florentine Room at eight o'clock.

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On Wednesday, May 26, the Chicago Fellows will entertain the Society and its guests at luncheon at the Flossmoor Country Club at half-past one o'clock.

The President called attention to a rule of the Society that the reading of papers is limited to twenty minutes and discussions to five minutes.

Papers were read as follows:

1. "Analgesia and Anesthesia in Labor," by Dr. Edward P. Davis, Philadelphia, which was discussed by Drs. Carl Henry Davis, Wakefield, Paddock, Polak, Baer, Watson and Pomeroy, after which the discussion was closed by the essayist.

2. "The Induction of Labor, with Special Reference to the Use of Quinin and Pituitrin," by Dr. Benjamin P. Watson, Toronto, Canada.

3. "Induction of Labor at Term," by Dr. Charles B. Reed, Chicago, Illinois (by invitation).

These two papers were discussed together by Drs. Pomeroy, Kosmak, Ehrenfest, Williams, Bailey, Holmes, Heaney, and in closing by the authors of the papers.

4. "The Prophylactic Forceps Operations," by Dr. Joseph B. De Lee, Chicago, Illinois.

Discussed by Drs. Williams, Eden, Polak, Byford, E. P. Davis, and in closing by the author.

On motion the Society adjourned until 2.30 P.M.

Afternoon Session. The Society reconvened at 2.30 P.M. and was called to order by the President.

5. "The Value of the Wassermann Reaction in Obstetrics, Based upon a Study of 4547 Consecutive Observations," by Dr. J. Whitridge Williams, Baltimore, Maryland, which was discussed by Drs. Gellhorn, Peterson, Polak, Bailey, and in closing by Dr. Williams.

6. "Extraperitoneal Cesarean Section," by Dr. John A. McGlinn, Philadelphia.

Discussed by Drs. Polak, De Lee, E. P. Davis and Holmes, after which the discussion was closed by the author.

SYMPOSIUM ON STERILITY

7. "Sterility in the Female: A Report of Operative Cures," by Dr. Charles G. Child, Jr., New York City.

8. "Essays in Simplifying Artificial Impregnation," by Dr. Robert L. Dickinson, New York.

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The symposium was discussed by Drs. Reynolds, Polak, Rubin, Gellhorn, Heaney, Boldt, Litzenberg, McMurtry, and in closing by the authors.

9. "A Brief Summary of Obstetric and Gynecologic Literature Published in the Last Three Years," by Dr. Hugo Ehrenfest, St. Louis, Missouri (no discussion.)

On motion, the Society adjourned until 9 A.M., Tuesday, May 25.

SECOND DAY, *Tuesday, May* 25, 1920

Morning Session. The Society met at the South Shore Country Club at 9 A.M. and was called to order by the President.

10. "The Care of Infected Abdominal Wounds," by Dr. Thomas J. Watkins, Chicago, Illinois.

Discussed by Drs. Eden, Brettauer, McGlinn, Child, Anspach, Bovée, Reynolds, Byford, Peterson, Smith, and in closing by the author.

11. "Acidosis in Operative Surgery and its Treatment by Glucose and Gum Acacia given Intravenously," by Dr. Lilian K. P. Farrar, New York (by invitation). Discussed by Drs. Woodyatt, Taussig, Frank, Watson, Ward, Gellhorn, Bovée, De Lee, Kosmak, and in closing by the author.

12. "The Demonstration of Certain Transitional Changes from the Benign to Malignant Conditions in the Ovary, Uterus and the Vulva," by Dr. Thomas Watts Eden, London, England (by invitation). Discussed by Drs. Frank, Taylor, Taussig, John G. Clark, Gellhorn, Adair, Brettauer, DeLee, and in closing by Dr. Eden.

The hour having arrived for the delivery of the President's Address, the second Vice-President, Dr. Jennings C. Litzenberg, took the Chair, and introduced the President, Dr. Robert L. Dickinson, New York, who delivered his address.

At the conclusion of the address, Dr. Edward P. Davis, moved that a vote of thanks be extended to President Dickinson for his inspiring and instructive address.

Seconded and unanimously carried.

On motion the meeting adjourned for the Business Meeting.

BUSINESS MEETING

At the South Shore Country Club, Chicago, Illinois, on May 25, 1920, the Business Meeting was called to order at 12.30 P.M. by the President, Dr. Robert L. Dickinson.

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The minutes of the preceding meeting were presented as published in the *Transactions*, and were adopted as printed.

Letters and telegrams of regret were announced from Drs. Barton Cooke Hirst, Reginald M. Rawls, Le Roy Broun, Thomas S. Cullen, Walter W. Chipman, Walter P. Manton, J. Clarence Webster and Gideon Brown Miller.

The Secretary announced that Dr. Bache McE. Emmet, an Honorary Fellow, was seriously ill and not expected to recover. Motion was made and carried that the Secretary send a telegram to him expressing the sympathy of the Society.

There has occurred one death this year. Dr. Xavier Oswald Werder, of Pittsburgh, an Active Fellow since 1916, on November 20, 1919.

The Secretary presented the report of the Council, stating that Drs. George Tucker Harrison, Charles M. Green and William E. Ashton desired to become Honorary Fellows, and that with the approval of the Council these gentlemen were made Honorary Fellows in accordance with the By-Laws. This leaves the membership of the Society with 90 Active Fellows and 10 vacancies.

The Treasurer's report was presented, and after being audited and reported correct by the Auditing Committee, consisting of Drs. Morley and Pomeroy, it was received and placed on file.

On recommendation of the Council it was moved, seconded and carried that the assessment of $5 be continued this year to meet the increased expenses.

On recommendation of the Council it was moved, seconded and carried that the names of Drs. Reuben Peterson, J. Wesley Bovée, and George Gray Ward, Jr., be presented to the American College of Surgeons as candidates for Governors representing the Society in accordance with the request of the College.

The Secretary stated that it was necessary to appoint a delegate and alternate to the Congress of American Physicians and Surgeons, which meets every three years. The Council recommended that Dr. J. Wesley Bovée, Washington, D. C., be the delegate, and Dr. John G. Clark, Philadelphia, be the alternate. Moved, seconded and carried.

The Secretary called attention to a letter from the American Child Hygiene Association, which stated that a resolution was offered at their meeting by Dr. Fred L. Adair, of Minneapolis, recommending that the American Gynecological Society appoint

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a committee to confer with their Society in reference to Child Hygiene and Maternal Care. It was moved, seconded and carried that such a committee of three be appointed, with Dr. Adair as Chairman, he to select the other two members of the committee.

The President announced that following the suspension of the *American Journal of Obstetrics and Diseases of Women and Children*, that several conferences had been held with men interested in obstetrics and gynecology from various sections of the country, and that it was the consensus of opinion that a journal devoted to these specialties should be published with the endorsement of the various societies interested; and that the Council recommended that it be empowered to develop a journal of obstetrics and gynecology in conjunction with other special societies which would not involve any financial obligation to the Society. It was moved, seconded and carried that this recommendation be adopted.

The Secretary stated that the Council wished to announce that in accordance with the By-Laws they had nominated Dr. A. H. Freeland-Barbour, of Edinburgh, Scotland, and Dr. Thomas Watts Eden, of London, England, for Honorary Fellowship. As the By-Laws provide that such nominations made by the Council must be announced at the meeting one year before the election takes place, these nominations will appear on the list of candidates and will be voted upon at the next meeting of the Society.

The Council recommended the endorsement of the Society for the furtherance of an International World Conference of Obstetrics and Gynecology, which is now in process of formation. The President stated that action was formally taken on this matter last year, and unless there were objections the action would stand.

The special committee on Research Work in Gynecology and Obstetrics, which was appointed last year, presented the following report:

Introduction by Arthur H. Curtis

It devolves upon me to introduce this subject and to briefly discuss certain phases as seen from the gynecological aspect. I wish to emphasize that the remarks about to be addressed to you are not a voluntary contribution, but represent the efforts

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of a committee; that this committee is enjoined to candidly express its views, and that we who submit this report do not in any way claim that our opinions are faultless. Nor do we wish to have our personal records sharply scrutinized by those who wonder why we fail to practice all that we preach.

The time for specialization in the various branches of medicine is at hand; no argument is needed to establish this fact. In our own specialty the tide of progress may tend to isolate the practice of obstetrics, or may produce other changes not thought of at the present time. Be that as it may, endless argument will probably influence very little the scope of our future activity. In any event, it appears better for us to limit discussion of this subject, and to concentrate more effectually upon promotion of the work in hand. Those who are productive will learn to adapt themselves to such changes as occur, and will continue to find a wide range of usefulness.

One keynote to a solution of our problems, I believe, is to be found in unselfishness. Each of us (and I refer especially to those who control college or hospital opportunities) should feel it his duty to provide laboratory facilities for those who wish to work, should give to this department the inspiration of direct personal contact, and should be responsible for moderate financial assistance or see that this is forthcoming. I would especially emphasize that those young men who desire to conduct a combined clinical laboratory study are entitled to enough clinical material to enable them to carry on this investigation.

Slemons very aptly states that this Society needs to create an atmosphere appreciative of efforts along investigative lines. In this connection, a fundamental prerequisite in the selection of members for the Society, and in the election of our officers, should be productiveness in the furtherance of obstetrics and gynecology; this may be through personal achievement or through opportunities offered and stimulation given to younger men. As an excellent example of one who is helpful to others, I would mention Dr. Billings, who, in sharing his practice, in donation of funds, in visits to the laboratories, in public commendation of scientific work, has contributed so much to our profession. Valuable constructive work has been achieved by our own members, but individual mention at the present time would smack too much of flattery and would lead us far afield. I would not belittle the pure clinician, but he who fails to con-

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tribute his bit in an endeavor to assist medical progress has no proper place in a society which professes to lead all who feel interest in gynecology and obstetrics.

Passing on to special problems, the so-called "referat" system may be considered. If resumed by the Society it would appear advantageous to assign each topic at least two or, preferably, three years in advance. As suggested by Dr. Gellhorn, an attractive plan would be to select one comprehensive subject, alternatingly gynecologic and obstetric, the report to be entrusted to two or more men, who should contribute a complete review of the literature, to which they may add their own views and observations. At the time of this report other members of the Society should present the greatest possible number of papers on the same subject, the latter to be strictly limited to personal investigations and studies.

Those who recommend competitive prizes to stimulate research are somewhat qualified in their enthusiasm. A limited experience makes me believe that rewards so given arouse only spasmodic efforts and would accomplish little for us. As a counter-suggestion I would advocate that this Society bestow each year three or more non-competitive prizes to those who publish the best original American contributions to gynecology and obstetrics.

With some misgivings I suggest that we might also consider the publication each year of an honor roll, these names to appear in one or more leading journals, and to comprise a list of those who, during the year, have, in our opinion, made notable contribution of any sort whatsoever to the advancement of obstetrics or gynecology.

Many of us, at previous meetings, have obtained much benefit from papers contributed by men interested in the fundamental sciences. Our enthusiasm should receive a decided impetus from two or three well selected yearly presentations of this sort. Such papers should have a direct relationship to obstetrics or gynecology; otherwise, there is little likelihood that they will inspire us with new ideas for further work.

There is, at present, a great dearth of opportunities for young men who wish to become gynecologists, and it is to this that I particularly wish to direct attention. Within a brief period, four capable applicants, who have already completed a general internship and who are apparently willing to do their utmost

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to obtain proper training, have applied to us for help. There are at present very meagre facilities for aiding such men. This, to my mind, is one of the most vital of problems which confront us, and one which promises to yield if properly attacked; on its solution depends the caliber of our future members.

I would suggest the appointment of a committee entrusted with the task of advising this Society how we can best make openings for desirable candidates who wish to pursue the specialty of obstetrics, gynecology, or both; this committee to be supplied with funds for travel and other expenses of investigation. Their duties would possibly involve conferences not only with our members, but with hospital authorities, with others who control the selection of residents, assistants and laboratory volunteers, and with organizations interested in improvement of hospital standards. When provision has been made for even a limited number of places where young men may apply for work, where they may be free from financial worries, and where, in the course of four or five years, they may develop a proper scientific spirit and a groundwork of technical skill, we need then have no anxiety about the welfare of this society, nor about the future specialty of obstetrics and diseases of women.

ARTHUR H. CURTIS.

Report of the Committee Appointed to Suggest Plans Whereby the American Gynecological Society may Promote the Advancement of Gynecology and Obstetrics

In preparing that portion of the report on obstetrical topics suitable for original research and investigation, the undersigned felt constrained to include not merely questions of technical interest, which may still demand further study and could possibly be designated as "unsolved," but also those matters of a wider import in which not only the profession but the laity may manifest a justifiable interest. In some instances the purely technical and the broader phases of a problem may, of course, be dependent each upon the other, and in other cases the coöperation of other specialist branches may be demanded.

The first part of the report is concerned with the purely technical phases of obstetrics, the second with questions of a

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more general interest. I have found it possible to present only a comparatively small number of topics, there are many more unsolved problems and it is this admitted fact which should make of obstetrics a science rather than an art. When a specialty of medicine or other profession has reached a stage of satisfied completion, then its life is gone. The elements of uncertainty and mystery are the factors which stimulate the desire and interest to solve those problems of which a few are herewith presented.

The Biologic Diagnosis of Pregnancy. The attempt to diagnose pregnancy where the physical findings do not give the necessary information culminated in the attempts of Abderhalden to establish this on a biologic basis. A great deal of dissatisfaction has arisen with this method because of its complex character and probable lack of specificity. Some procedure by means of which we can diagnose pregnancy in the earlier months is still desired. A review by Bar and Ecalle (*Archives Mens. d'Obstétrique et de Gynécologie*, July, 1919, No. 7, viii) of the various tests employed for this purpose, including the deviation of complement test, the Abderhalden, the intradermal reactions, the changes in the antitryptic power of the serum, and the activating power of cobra venom, prompted the conclusion that the clinical benefit derived from these researches is very mediocre and out of all proportion to the efforts made. The results show, however, that the work already done is of importance because, as Bar and Ecalle state, a better understanding has thus been obtained of the mechanism of the rapid adaptation of the maternal organism to the development of the fetus, the symbiosis of mother and fetus and its anomalies. The subject, therefore, is of intense interest not only from the practical but the theoretical standpoint and worthy of further attention.

The Causes of the Onset of Labor. Very little experimental work has been done to determine the causes which bring about labor and why they vary in their degree of manifestation. The theoretical explanations previously advanced to account for the same have largely been lacking in physical proofs. It is rather important to devote some attention to this matter, as our methods of inducing labor may be reformed by the results of such investigation. The exhibition of oxytoxic substances on the one hand, and mechanical appliances such as

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bougies, gauze packs, and bags on the other, may perhaps be largely done away with by the discovery of the immediate cause of labor. Although successful in most instances their employment is not strictly physiological.

THE INFLUENCE OF THE NUTRITION OF THE MOTHER UPON THE SIZE OF THE FETUS. This subject has undergone radical changes of opinion in the last decade and a very recent contribution by Ehrenfest seems to show that the size of the fetus cannot be distinctly influenced by dietetic measures applied to the mother. It may be generally assumed that a healthy mother predicates the birth of a healthy and normally developed child, but a better knowledge of the process would seem important if we are to influence in any way the size of the child with relation to the maternal passages. Studies on fetal metabolism based on animal experiments have not been completely interpreted and require further elucidation in their relation to the human subject.

STERILITY. More thought must be given to the explanation of certain obscure questions relating to this condition. Our knowledge of the mechanical factors is quite well developed, but there are any number of cases apparently free from defects in whom impregnation does not take place notwithstanding the presence of a normal spermatic fluid. The fact that women who have been sterile with one husband and become impregnated after a second marriage, demonstrates that some physiological agreement, as it were, must exist between the vaginal secretions and the spermatic fluid. The question of a possible disturbance in this physiologic relationship must still be worked out and methods for correcting the same developed. Whether artificial impregnation will overcome such faults is a matter that has not been tested sufficiently to warrant satisfactory conclusions; but if it is determined to employ the same, some method ought to be devised by which the biological relationship between the two sexes can be tested.

The futility of plastic operations in many cases has not been sufficiently impressed upon the profession and they are still done in large numbers. Undoubtedly there are cases in which mechanical procedures may with advantage be employed, but the indications for the same should be subjected to further study.

The effect of endocrine gland feeding in certain cases of sterility must be submitted to definite experimental trials by

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those not overcome by mere enthusiasm for these therapeutic measures without sufficient basis in fact.

THE CAUSES OF ABORTION. In determining the causes of abortion, aside from those of a traumatic character, syphilis has been assumed to be the common factor. Undoubted instances have been described of infections by other organisms, including the streptococcus, pneumococcus, bacillus influenza, etc., and the accident also been ascribed to the presence of the bacillus abortus of Bangs, but no extended series of observations in the human subject are at hand in which comparative studies have been made of these etiological factors.

THE OCCURRENCE OF PREGNANCY AFTER RADIUM APPLICATIONS FOR UTERINE BLEEDING. The increasing employment of radium to check hemorrhage in non-malignant cases has not been in use for a sufficient length of time to determine what influence this may have on possible future pregnancy. The question whether the influence of radium on the ovaries in addition to inhibiting the menstrual flow, also interferes with the production of ova, is an important topic for further study; likewise whether such pregnancies, if they do occur, are normal, and whether the resulting fetus shows any evidences of maldevelopment.

THE ETIOLOGY OF ECLAMPSIA. This topic is one of constant interest and although the results of treatment based on the supposition that we are dealing with a pure toxemia have been quite remarkable, there is still need of further research in this field. It is possible that our ideas as to this complication of pregnancy must be revised and that we cannot consider the various toxic manifestations as due to one source. Whether such so-called toxemia is a purely metabolic disturbance or dependent on other causes still remains uncertain. It is not definitely established whether the toxemias of the early months of pregnancy, associated with hyperemesis, are the same as those of the later months. Whether the theory developed by J. C. Hirst that a subsidence of certain ovarian functions connected with the development of the corpus luteum of pregnancy is at fault, or whether we are dealing with a defect in the adaptation of the growing fetus to the maternal organism, is a question still to be solved. As for the toxemias of the later months of pregnancy further researches in metabolism are essential. Urinary changes have been pretty thoroughly studied, but the chemistry

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of the blood in this condition is a fruitful field for investigation.

The infectious nature of the toxemias of pregnancy has often been referred to; likewise the possible effect of certain climatic changes. An interesting study would include a comparison of the incidence of eclampsia with barometric and other atmospheric disturbances as determined by official weather bureau charts. Likewise the occurrence of pregnancy toxemia in groups in certain localities. There is not on hand any extended and related series of observations on this subject.

While prophylactic measures have undoubtedly reduced the incidence of eclampsia, it is still an occurrence of alarming frequency. Until the etiology of this condition can be placed on a more satisfactory basis the treatment of the same must remain more or less empirical. The pendulum seems to have swung in recent years to conservative methods and a sufficient number of cases have now been treated by this means to warrant the presentation of collected statistics based on the experiences of a considerable number of institutions and observers. Reduction in the proteid intake has been considered an essential factor in the diet of toxemic states, but the recent work of Epstein and others on edema is rather disturbing to our accepted views. The writer describes cases associated with parenchymatous nephritis in which a hydremia occurs accompanied by a diminished amount of protein in the blood. The latter is assumed to be due to the loss of this material through the urine and Epstein therefore advises the liberal feeding of protein as the most effective way of managing such cases. As edema in pregnancy, aside from the undoubted mechanical causes, is usually assumed to be an accompaniment of disturbed renal function, it is possible that our views regarding the prophylactic feeding of these patients must be reformed.

THE PHYSIOLOGY AND PATHOLOGY OF THE PLACENTA. The opinion has gained ground that the placenta is a specialized and highly organized gland which not only governs the gaseous interchange between the mother and fetus but also has a metabolic function which may be compared to that exercised by the bowel. It is also assumed that the placenta develops an "internal secretion" which has been found to have well-marked oxytoxic powers. Whether any practical use can be made of this knowledge is still a matter for further study.

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Infection of the placenta during pregnancy has been demonstrated by Slemons, who found in some instances an acute exudative infiltration and likewise demonstrated bacteria in the act of penetrating the placental vessels. He believes that the bacteria enter the placenta by way of the amniotic membranes and fluid, but hematogenous infection likewise occurs. Such infection may lead to the death of the fetus shortly before birth and possibly accounts for many stillbirths. In his opinion placental bacteremia is outranked only by syphilis and birth injuries. It is also probable that the incidence of placental bacteremia and intrapartum fever is identical. In view of these facts a more careful routine study of the placenta seems to be demanded, especially in cases of prolonged labor with rupture of the membranes and also in cases of fetal death. Further research may therefore profitably be undertaken along these lines and likewise the possible effect of infection on the production of monsters—such examinations to include the bacteriology and histology of this organ, which can readily enough be done in any well-organized laboratory.

Puerperal Sepsis. Statistics show that puerperal sepsis still claims an enormous number of victims. It is hardly necessary here to present such statistics in detail. Prophylaxis has accomplished wonders, but we are still confronted with the large mortality and morbidity of this most serious complication. Conservative treatment is now widely acknowledged, dependence being placed on the recuperative powers of the patient. Non-interference is very generally insisted upon, but in the face of a general invasion of the maternal organism that cannot be controlled we must look for some more radical means of cure. The injection of sera, vaccines, antitoxic substances, chemical germicides, etc., have been taken up in turn, only to be largely abandoned as unsuitable. But the war against puerperal fever must be kept up and there are certain factors in the etiology that still need elucidation. It is possible that examinations of the vaginal secretions as a routine measure may lead to prophylactic suggestions, but much still remains to be done in this field. We are quite thoroughly informed of the bacteriology of the genital tract after infection takes place, but considerable uncertainty still exists regarding the same in the antepartum stage.

Statistics of Cesarean Section. The indications calling

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for the performance of cesarean section and the advantages associated with the various types of operation may be accepted as quite firmly established, but there are certain questions that are not yet satisfactorily determined. Whether cesarean section is preferable to induction of premature labor, pubiotomy, high forceps, version, or other alternative procedures depends to a large degree on the ability of the individual operator and the environment, but we are still in need of studies based on a large series of cases from which the comparative morbidity and mortality of cesarean section with other operative methods of delivery can be determined. The occurrence of sterility after cesarean section is a question that also demands investigation.

Syphilis in Pregnancy. With the discovery of the etiology of this disease and certain newer conceptions of treatment, our responsibilities may be said to have increased. Recognition of this disease was formerly based on clinical symptoms, and in view of the inability to locate primary lesions in the female genital tract the diagnosis was often unsatisfactory. Now that the Wassermann test has been accepted as a conclusive method of diagnosis, is it not advisable to make a routine serological examination in every case of pregnancy, even where no suspicious symptoms are present? The treatment of syphilis is now definitely established and we have an undoubted means for successfully combating the disease. Its ravages are nevertheless still to be regarded as extensive and in order to eliminate the scourge shall we resort to more radical measures? Would it not be possible to regard a routine Wassermann test in every case of pregnancy in the nature of a prophylactic measure? Heroic steps have been taken to eradicate smallpox and without much question vaccination against this pestilent disease is generally adopted all over the world. Gonorrheal ophthalmia is combated by a routine instillation into the eyes of every newborn child and in many instances a failure to do so is considered an offence punishable by fine or imprisonment. The recent development in the prophylaxis of diphtheria by inoculation in infants may likewise be cited. It has been claimed that at least 40 per cent. of women infected with syphilis present no objective symptoms, nor are they aware of their condition. It is characteristic of the disease that both primary and secondary lesions disappear without treatment. This accounts for the

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widespread character of the disease and its innocent propagation. Asylums for the insane and feeble-minded would probably be less crowded if this etiological factor in the production of their inmates could be eliminated. Hereditary syphilis is without question one of the most important factors in the production of a large train of chronic diseases and as obstetricians we must consider ourselves responsible to a certain degree. As already noted, syphilis is a disease that can be successfully treated and if the numerous suspected cases can be diagnosed and treatment administered, much good will result.

The recent splendid work of Dr. J. Whitridge Williams and other investigators should stimulate the study of material from other large hospitals and an attempt made by the collection of statistics from the entire country to place our knowledge of the incidence of syphilis in pregnancy on a definite basis. It is possible that the proportion of infected women is overestimated but if a study of a series of consecutive cases shows positive Wassermann reactions in 4 or 5 per cent. it is probable that the distribution is as extensive as is usually assumed. If a diagnosis is made before delivery an opportunity is often afforded for successful treatment. It is necessary, however, to follow up these cases and by subsequent examinations to determine whether the infection has been eliminated. It may be safely claimed that a more extensive study of this subject covering a large number of cases in widely distributed centers of population will do much to reduce the incidence of the disease in general and at no time can this be more successfully worked out than during the period of pregnancy.

Having considered briefly certain purely technical phases of our subject, attention may be directed to a few of a more general interest.

Reduction of the Birth-rate. It has been grudgingly admitted, but it is nevertheless true, that the birth-rate of many so-called civilized countries is undergoing a steady decline. Some governments have taken note of this fact and appointed special investigating commissions. Thus England has at work a National Birth-rate Commission, which is about to present a report in which a very broad point of view has been developed with the idea that it is necessary to take note of the development and education of young people for worthy parenthood. Thus consideration is given to various methods of education,

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particularly in physiology and hygiene, to the influences and conditions which favor or retard physical and mental development of adolescence, and the extent to which worthy ideals of citizenship and parenthood should be inculcated by education in its widest sense. Other matters include the influence of industrial occupations on the birth-rate, the housing problems, and schemes for the endowment of motherhood.

In France, the "National Alliance for Increasing the Birth-rate" has already studied this question along similar lines and has recently even recommended a scheme of State allowance for large families. It appears that conditions in this country are approaching a similar state and that while we have not made as complete a study of the subject, the opinion is gaining ground that we are surely approaching a decline in the birth-rate. Is it not appropriate for us as obstetricians and gynecologists to take note of these matters and to bring them to the notice of the proper authorities as a part of the larger interest which our profession should manifest toward the public welfare? This might take the form of a memorial presented to Congress for the appointment of a National Commission to study the subject. Facts and figures will undoubtedly be developed by the recent national census, which can be employed for the purpose.

It would appear appropriate for this Association to take some note of the agitation which is spreading throughout the country for the development of better maternity care, not only in our large and crowded centers of population but in the rural districts. The coöperation between this Society and the Federal and State Bureaus which have thus far given their attention to the subject, might be coördinated. This is a topic that might well be taken up by a National Department of Health when this is once established and a Secretary to preside over its functions made a member of the Cabinet. The American Medical Association at its last session voted to memorialize Congress on this subject and this Society might well appoint a committee of coöperation when the actual study of some of the problems has been started.

The teaching of obstetrics has received increasing attention in recent years—a clear demonstration of the importance of this branch of medicine. The assumption that childbirth was a normal process long served to restrict the development of obstetrics and labelled it as an art rather than a science. This

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view has fortunately undergone a change, but further reformation in the teaching of obstetrics is necessary to emphasize its importance in the eyes of the profession as well as the laity. Would it not be one function of this Society as the senior organization in the United States of specialists in this branch of medicine to assert its interest in the subject by the appointment of a committee on obstetric education? This body might with perfect right give attention to this important matter and after due deliberation present to the Society for further discussion and amendment a plan of at least minimum requirements for medical schools in this branch of medicine.

The somewhat cursory presentation of obstetric questions suitable for further research or study which is herewith presented, is of necessity incomplete. In gathering the material for the same the undersigned has been impressed with the need of doing something more than merely making an announcement of such problems that might be adopted as a formal report by the Society and then filed away in its archives. It would seem more important and valuable if this organization placed itself in a position to forward original investigation and research. How this may be accomplished must perhaps be left to further deliberations, but the suggestion might be advanced that in place of the temporary committee which has presented this report, a more permanent body be established. This committee should be appointed by the President of the Society and serve at his pleasure and that of his successors. Announcement of its purpose and readiness to coöperate in original research should be published. The possibility of discovering and developing research material would be of mutual benefit to the worker and to our organization, particularly as the latter would then be in a position to assist in the development of its future membership. Whether competitive essays or some more modernized and practical scheme of publication were developed as the result of these methods remains for the Society itself to decide.

This thought brings to mind the question whether the American Gynecological Society is to continue as a select private organization for the personal benefit of its limited membership, or whether by developing an importance based on its progressive growth and influence it can become a factor for good in the country at large, both among the medical profession and the laity. This may seem like a revolutionary thought, but the

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various elements in our community life are becoming knitted together very much more closely in these latter days and it becomes necessary for organizations such as ours to take a broader view of their responsibilities. For we have such responsibilities, because our membership is made up of leaders—leaders whose words and influence must extend beyond their strictly private functions or professional capacities.

We might well make use of the results of such original research in our annual meetings. For example, it has been suggested that a topic for study and discussion be announced one, two or possibly three years in advance. The arrangements can be placed in the hands of a special committee of two or three, under the direction of the Council, who by correspondence and publication can announce the topic and select from the material submitted that which is considered suitable for presentation. This should be open to non-members, who may then be invited to present their theses if it is found practical.

It is with the hope of bringing about such a change of ideals that the undersigned respectfully submits the above report.

GEORGE W. KOSMAK.

DR. BOVÉE.—I move that this very interesting report of the committee be received and referred to the Council for guidance and action.

Seconded by Dr. Watkins and carried.

THE SECRETARY.—The Council recommends to the Society the election of the following candidates for Fellowship: Drs. E. H. Richardson, Baltimore, Md.; William C. Danforth, Evanston, Illinois; Carl Henry Davis, Milwaukee, Wisconsin; Floyd E. Keene, Philadelphia, P.; Arthur H. Morse, New Haven, Conn.

Each candidate was balloted on separately and declared duly elected.

The report of the Nominating Committee for officers for the ensuing year was presented as follows:

President—Dr. W. W. Chipman, Montreal, Canada.
First Vice-President—Dr. Henry P. Newman, San Diego, Cal.
Second Vice-President—Dr. Hugo Ehrenfest, St. Louis, Mo.
Secretary—Dr. George Gray Ward, Jr., New York City.
Treasurer—Dr. Brooke M. Anspach, Philadelphia.

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Members of the Council—Dr. Robert L. Dickinson, four years; Dr. John O. Polak, one year, and Dr. N. Sproat Heaney, for one year.

The President then asked for further nominations from the floor and there were none. The candidates were then balloted for and unanimously elected.

THE SECRETARY.—The Council has suggested that the next meeting of the Society be held, if possible, in some place in New England, on the Thursday, Friday and Saturday preceding the meeting of the American Medical Association, which is to be held in Boston, in order to make it convenient for the Fellows to attend both meetings.

DR. WATKINS.—I move the adoption of this recommendation of the Council, and that the date and place of meeting be left to the Council for decision.

Seconded and carried.

On motion, seconded and carried, the meeting then adjourned.

Evening Session. The Society reconvened at 8 P.M. in the Florentine Room, Congress Hotel, in joint meeting with the Chicago Gynecological Society, with the President in the Chair.

14. "Microscopic Study of Ruptured and Unruptured Tubal Pregnancy," by Jennings C. Litzenberg, Minneapolis, Minnesota. (The discussion on this paper was postponed until the next session.)

SOCIOLOGICAL PROGRAM

15. "The Gynecologic Problem in Industrial Medicine," by Dr. Harry E. Mock, Chicago, Illinois (by invitation).

16. "The Relation of Obstetrics and Gynecology to Preventative Medicine," by Dr. Thomas Watts Eden, London, England (by invitation).

17. "The Importance of Developing Prenatal Care and a Maternal Welfare Program," by Dr. Fred L. Adair, Minneapolis, Minnesota.

18. "The Importance of a Follow-up System for Obstetric Patients," by Dr. George W. Kosmak, New York City.

The discussion of this symposium was by Drs. Pollock, Ries, Dickinson, Doane and De Lee.

On motion the Society adjourned until 9 A.M., Wednesday, May 26.

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THIRD DAY, *Wednesday, May* 26, 1920

Morning Session. The Society met at 9 A.M. in the Florentine Room, Congress Hotel, and was called to order by the President.

19. "An Overlooked Form of Cervical Endometritis," by Dr. Henry T. Byford, Chicago, Illinois. Discussed by Drs. Curtis, Boldt, Dickinson, Eden, and in closing by the author.

20. "Hemorrhages into the Pelvic Cavity Other than Those of Ectopic Pregnancy," by Richard R. Smith, Grand Rapids, Michigan.

The paper of Dr. Litzenberg, read at the previous session, and the paper of Dr. Smith were discussed together by Drs. Williams, Frank, Pomeroy, Watson and King, and in closing by Drs. Litzenberg and Smith.

21. "Errors in Gynecologic Diagnosis," by Dr. Reuben Peterson, Ann Arbor, Michigan.

Discussed by Drs. Gellhorn, Brettauer, Byford, Bovée, Heaney, Vineberg, and in closing by the author.

SYMPOSIUM ON RADIUM THERAPY

22. "The Present Position of Radium Therapy as an Educational Factor in the Diagnosis of Uterine Cancer," by Dr. William S. Stone, New York City.

23. "Operation or Radium for Operable Cancer of the Cervix," by Dr. William P. Graves, Boston, Massachusetts.

24. "An Analysis of the Failures in Radium Treatment of Cervical Cancer," by Dr. Frederick J. Taussig, St. Louis, Missouri.

The Symposium was discussed by Drs. John G. Clark, Burnam, C. Jefferson Miller, Bailey, McMurtry, Kolischer and Peterson.

25. "Hydatid Mole and Luteum Cysts," by Dr. William A. Coventry, Duluth, Minnesota (by invitation). No discussion.

26. "A Method of Covering Raw Surfaces upon the Uterus," by Dr. George Gellhorn, St. Louis, Missouri.

27. "The Operative Technic Employed in the Closure of an Extensive Vesico-Urethro-Vaginal Fistula," by Dr. George Gray Ward, Jr., New York City.

These last two papers were discussed together by Drs. Barrett, Peterson, King, C. Jefferson Miller, Bovée, Dickinson, and in closing by Dr. Ward.

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PRESIDENT DICKINSON.—In closing this meeting, one of the most largely attended that has ever been held, I understand, I wish to draw attention to the fact that twenty-six papers have been read and discussed. The average time for each paper and discussion was a little over half an hour. Your presiding officer deplores the fact that the Society had so much important scientific business to transact, and suggests that in the future that the Council devise some method which will prevent such discouraging conditions to authors of papers and the discussers of them. Your presiding officer regretted very much, on account of the program, that he had to jog the Fellows along who had valuable matter to give us and could not be allowed to present it in the limited time. There should be more time allotted for discussion.

We have received a telegram from the new 1st Vice-President, Dr. Henry P. Newman, San Diego, California, regretting his unavoidable absence, and expressing his hopes for a successful meeting.

To still further widen the influence of the Society, I would suggest that occasionally we meet west of the Rockies.

DR. C. JEFFERSON MILLER.—I move that we express our thanks to the Congress Hotel and to the local Fellows and to the Chicago Gynecological Society for the entertainment we have received at this meeting and for the kindnesses and courtesies extended to us.

Seconded and unanimously carried.

DR. GEORGE GELLHORN.—I feel that we owe a debt of gratitude to the gentleman who has so ably presided over our deliberations, and I move, Mr. Secretary, that a vote of thanks be extended to President Dickinson for the efficient manner in which he has conducted this meeting.

Seconded and unanimously carried.

As there was no further business to come before the meeting, on motion duly seconded and carried, the Society then adjourned *sine die*.

GEORGE GRAY WARD, JR.,
Secretary.

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CONSTITUTION

I. This Society shall be known as the AMERICAN GYNECOLOGICAL SOCIETY.

II. The object of this Society shall be the promotion of knowledge in all that relates to the Diseases of Women, to Obstetrics, and to Abdominal Surgery.

FELLOWS

III. The Fellows of this Society shall consist of Fellows and Honorary Fellows.

The Fellows shall not exceed one hundred in number.

The Honorary Fellows shall not exceed ten American (exclusive of those who have been Active Fellows of the Society) and twenty-five foreign.

"Candidates for Active Fellowship shall be graduates of medicine of at least ten (10) years' standing and shall be proposed to the Council by two Fellows *only*, who are not members of the Council, at least two months before the first day of the meeting, each nomination being accompanied by a list of the principal publications of the candidate and of the official positions which he holds. On nomination by the Council, each candidate shall be separately balloted for at the annual meeting. A two-thirds affirmative vote of all the Fellows present shall constitute an election, at least fifteen Fellows being present.

A list of all the candidates, accompanied by the names of their proposers, their official positions, and their principal publications, shall be sent to every Fellow with the notification of the annual meeting."

HONORARY FELLOWS

IV. The power of nominating Honorary Fellows shall be vested in the Council.

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No Honorary Fellow shall be voted on at the same Annual Meeting at which his name is recommended by the Council; but at the next succeeding Annual Meeting, except in the case of active Fellows of the Society being transferred to the Honorary List.

The election shall take place in the same manner as that of ordinary Fellows.

They shall enjoy all the privileges of other Fellows, but shall not be required to pay any fee or be allowed to hold any office, or to cast any vote.

Any member of this Society at the end of twenty-five years' active service in the Society; or at any time thereafter, at his own request, shall be placed on the roll of Honorary Fellows, and shall be so classified in the next volume of TRANSACTIONS, provided the request be made during the fiscal year for which the annual dues have been paid by that member.

OFFICERS

V. The officers of the Society shall be a President, two Vice-Presidents, a Secretary, and a Treasurer, and two other Fellows, all to be elected annually, who, with four other Fellows, one to be elected each year for a term of four years, shall constitute the Council of the Society.

All officers shall be nominated and elected in accordance with the By-laws.

The officers shall enter upon their duties immediately before the adjournment of the meeting at which they were elected, and shall hold office for one year.

Any vacancy occurring between the annual meetings shall be filled temporarily by the action of the Council.

All officers shall be eligible for reëlection.

ANNUAL MEETING

VI. The annual meeting of the Society shall be held regularly at a date to be determined by the Council, and shall continue for three days, unless otherwise ordered by vote of the Society at any executive session. The sole management

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of the annual meetings shall be under the control of the Council subject to any action of the Society at the preceding annual meeting.

AMENDMENTS

VII. This Constitution may be amended by a two-thirds vote of all the Fellows present at an annual meeting, provided that notice of the proposed amendment has been given in writing at the annual meeting next preceding, and that the same has been printed in the notification of the meeting at which the vote is to be taken.

BY-LAWS

PRESIDENT AND VICE-PRESIDENTS

I. The President and Vice-Presidents shall discharge the duties belonging to their respective offices. The President shall be *ex officio* chairman of the Council.

SECRETARY

II. The Secretary shall attend and keep a record of all the meetings of the Society and of the Council, of which latter he shall be *ex officio* clerk, and when not in session shall perform its business by correspondence.

At each annual meeting he shall announce the names of all who have ceased to be Fellows since the last report.

He shall superintend the publication of the TRANSACTIONS, under the direction of the Council.

He shall notify candidates of their election to Fellowship.

He shall send notifications of the annual meetings and of the meetings of the Council.

TREASURER

III. The Treasurer shall receive all moneys due and pay all debts. He shall render an account thereof at the annual meeting, when an Auditing Committee shall be appointed to report.

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COUNCIL

IV. The Council shall meet as often as the interests of the Society may require.

Five members shall constitute a quorum.

It shall have the management of the affairs of the Society, subject to the action of the Society at its annual meetings.

It shall arrange the order for the reading of papers at the annual meetings.

It shall not have power to make the Society liable for any debts exceeding in total one hundred dollars in the course of any one year, unless specially authorized by a vote of the Society.

It shall have the entire control of the publications of the Society, with the power to reject such papers or discussions as it deems best.

The President, or any three members, may call a meeting, notice of which shall be transmitted to every member two weeks previous to the meeting.

The Council shall determine questions by vote, or—if demanded—by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and By-laws, or for conduct unbecoming an honorable physician, and shall have the sole power of moving the expulsion of any Fellow.

NOMINATION AND ELECTION OF OFFICERS

V. Nominations of officers shall be made by a committee consisting of the five ex-Presidents who have last served as Presidents and of three Active Fellows appointed by the President on the morning of the first day of the meeting. The ex-Presidents shall report their presence on the morning of the first day to the Secretary.

This committee shall meet on the first day of the Annual Meeting and shall nominate candidates for the various elective offices.

In case of a tie vote in the nominating committee for officers, the acting President of the annual meeting shall be empowered to cast the deciding vote.

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The nominations shall be reported and posted on or before the morning of the second day of the meeting.

Any member of the Society shall have the privilege of nominating candidates at the business meeting of the Society.

The Fellows nominated as officers shall be elected by ballot.

ORDER OF BUSINESS

VI. The Order of Business at the annual meetings of the Society shall be as follows:

I. General meetings at 10 A.M. each day.
   1. Reports of the Committees.
   2. Reading of Papers and Discussion of the same.

II. The Business Meeting, at which only Fellows of the Society shall be present, shall be held on the second day of the session, at an hour determined by the Council and announced on the program of the meeting. The Secretary's Record shall then be read; the Treasurer's accounts be submitted; the reports of committees or other than scientific subjects be received; and all miscellaneous business be transacted.

PAPERS, ETC.

VII. The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than *two weeks* before the first day of the meeting.

No paper shall be read before the Society which has already been printed or has been read before another body.

All papers that may be read before the Society, and accepted for publication, shall become the property of the Society, and their publication shall be under the control of the Council. Such papers may be published in full in medical journals, provided that they are also printed in the TRANSACTIONS.

QUORUM

VIII. A quorum for business purposes shall be fifteen Fellows.

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DECORUM

IX. No remarks reflecting upon the personal or professional character of any Fellow shall be in order at the annual meetings, except when introduced by the Council.

ASSESSMENTS

X. Every Fellow shall pay in advance the sum of twenty dollars annually.

Any Fellow whose subscription shall be more than nine months in arrears shall be reminded of the fact by the Treasurer in writing; in event of payment not being then made, he may, on vote of the Council, be dropped from the Society.

Each Fellow shall pay on admission an initiation fee of twenty-five dollars.

ATTENDANCE

XI. Any Fellow who shall neither attend nor present a paper for three successive years shall, unless he offers an excuse satisfactory to the Society, be dropped from Fellowship.

AMENDMENTS

XII. Any of these By-laws may be amended, repealed, or suspended by a two-thirds vote of the Fellows present at any meeting. *Provided*, Previous notice in writing has been given at the annual meeting immediately preceding the one at which the vote is to be taken.

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ADDRESS OF THE PRESIDENT

SUGGESTIONS FOR A PROGRAM FOR AMERICAN GYNECOLOGY

By Robert L. Dickinson, M.D.
New York

Opportune and insistent, in these days of analysis and readjustment, there stand out, in our constitution and in our motto, two special phrases. "The object of this Society," says the former, "shall be the promotion of knowledge in all that relates to the Diseases of Women, to Obstetrics and to Abdominal Surgery." Our motto may be rendered: "Like the stars, each revolves, without haste, without rest, around his own particular task." "All that relates," says one; "his own task," says the other.

Survey. In earlier years the urgency that was inherent in certain parts of the work put off the balanced promotion of the whole, and it was also inevitable that tangents should be struck off from our own orbit. But now it is meet and right, as several authors in the past year have urged, that we diligently examine ourselves whether our own omissions have had anything to do with such situations as an untouched obstetric mortality and morbidity and the threat of eclipse of the gynecologic guild. Surgery we promoted. But if we be just surgeons, by surgeons we may be displaced. Diagnosis we developed and principles we have taught, until all may follow and supplant. The point is come where old fields must give new crops and new lands be opened up or our claims surrendered. The war searched out most of the barren spots in medicine and the geography of the spots. In that search the Council of Defense, and then the Army, sifted the men and the methods of every specialty save

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one. Our group-work, useless to war, escape ordered scrutiny, and now, after the war, presents the anomaly of being without an inventory and lacking in data on which to construct a plan for intensive culture. Some material is provided, of course, in the studies of standards in colleges and hospitals made by the American Medical Association, the American College of Surgeons and the Carnegie investigations. Further studies into the various departments of medicine are imminent. It is for us to decide whether we shall lead or be led in such surveys. Now, we see, as in a speculum, darkly. We may say how we wish to be seen in the future.

Extent of the Field. There are reasons why our specialty should readily lend itself to this scrutiny. It presents the paradox of being limited, yet large. The total list of disabilities is brief compared with general surgery—the actual incidence is surprisingly large. Gynecologic operative procedures comprise one-fourth of the surgery of sorts. The figures on which the above statement was made have been derived from a review of notices of operations issued daily in Chicago and New York.

One-fourth of surgery. Yet this does not indicate the extent of the field, since operation is needed by less than one-tenth of the patients that come to the doctor for ailments peculiar to women (childbearing not included). Even this last figure will alter greatly, though lowering the operative percentage when thorough routine preventive examinations shall prevail. Thus, whether for sheer bulk, or for need of skill of scalpel, or for setting a pace for humane handling of the human personality, our field may claim to be without parallel in opportunity.

New Work. In searching for the gaps in the promotion of knowledge in our task the questions naturally arise: Are there problems which the man in our line is alone qualified to solve? Are there studies or pronouncements that such a society as this is particularly equipped to undertake? An affirmative answer would include such subjects as the following paragraphs take up, though one cannot presume to make more than a sketch of the whole area.

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NOMENCLATURE. A standard nomenclature should be a matter of agreement on the part of authoritative organizations. At present we find ourselves unable to place in parallel columns the results of writers and institutions in general. A new start has been made. All the great groups involved were invited to unite in action and to come together on one list centering in a government office. The Census Bureau has just issued the volume herewith presented. It is evident that the Bureau no longer confines its interests to the defunct. This "Standard Nomenclature of Diseases and Pathologic Conditions, Injuries and Poisonings for the United States" is submitted to you by your President, the chairman of the original committee. It is submitted for criticism and suggestion as a first step—and a first step only—toward ultimate agreement, in the hope that we will amend this edition and care to keep an active representative on the main committee. The hearty coöperation and representation of the Army, the Navy, the Public Health Service, the various national medical organizations, the large insurance companies and all factors having to do with vital statistics make this volume representative as no previous attempt in any language has ever been representative.

OPERATION NOMENCLATURE. To supplement and complete this action there should be produced an acceptable list of operative procedures. Your presiding officer submitted to some of you several years ago such a working list. He is glad to find a member noted for thoroughness newly laboring on this set of terms. Without this standard no two operators can be sure they are comparing the same processes, the variant use of the words "total hysterectomy" being an instance in point.

DEFINITIONS. While we are delimiting terms there are not a few that appear in every hospital report that make for confusion for which exact bounds could be set. Among these are the words "major" and "minor" as applied to operations. We might even find or invent a name for a member of our double or bracketed specialty. We might define the qualifications for membership in this Society. Such a statement of a standard does not exist.

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STANDARDS. The Society might take upon itself to establish certain standards in obstetrics and gynecology. Just what is meant by "standards?" I take it to be the best present practice, widely studied, fairly epitomized, succinctly written down, warily applied. Though concrete, it is not set like cement, as some assume. Rather does it alter as its alteration finds, rising to meet each step of well-attested progress, sanely adapting its content to each special group of conditions, but never falling below a reasonably high requirement. Says Dr. George Vincent: "It is well to recognize the relativity of ideals. In human institutions there are no absolute standards." He goes on to give the warning that while the highest ideals may be approximated in a few institutions it "Would be a serious mistake not to recognize various degrees of achievement. All that can be confidently claimed is that some . . . fall far below any standard that can be recognized as guaranteeing results which will safeguard the public and protect the profession. There is danger that the existence of a standard may force a formal rather than a real compliance with ideals," and "a premature effort to conform to a standard may do actual harm." However this may be—and it applies equally to detail of every-day procedure as well as to great issues—there can only be profit in setting forth certain attainable ideals. This, as the College of Surgeons shows us, is found in actual practice to be the essential step, and in most cases all that is needed. The competitive instinct does the rest. If we were to place side by side the product and practice of a certain finely equipped Northern clinic and that of one small Southern service that steadily breeds teachers our Society would be fulfilling its function of promoting knowledge concerning obstetrics—in the minds of one set of trustees. The publication of the average necessity for Cesarean compared with its frequency in one of our clinics had only to be stated to bring strong condemnation. The Society can get publicity where individuals could not. We can report on ourselves and on our own communities. As Henry S. Pritchett said in the last Carnegie report on teaching: "There could be no more wholesome contribution to education today

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than to ask our universities to take stock of themselves. No process could be more helpful than to ask the governing bodies of these institutions to render a sincere and critical statement of the results obtained in the last twenty-five years." We may well do this for our department. And we may do another service in this line that would initiate a most wholesome contribution to surgery. This service would consist in taking stock of unnecessary operating. Such stock-taking should begin with our own clinics, for the least excusable of unnecessary suffering is that inflicted on women—and particularly on mothers of young children.

AXIOMS. Even though for the present any general acceptance of certain items of betterment in practice may seem unlikely, forward progress should initiate with us and not be imposed upon us by the demand of public opinion. Advocacy of axioms like the following cannot fail to bring about greater confidence in the profession on the part of the laity:

"Except in emergency, no operation without consultation, medical and surgical." The chief will himself set the example and see to it that the conferences will not be merely perfunctory.

"The findings at consultations set down in writing."

"Every patient discharged after operation to be provided with a written statement of the postoperative diagnosis and the operative measures."

"A patient (of office, hospital or sanitarium) is not getting fair or full value for her fee who does not receive a statement in writing—a diagnosis when provisionally or definitely made —a summary of treatment found to be successful or to fail."

"No woman may be examined unclothed or have a pelvic examination made (except in emergency) without the presence of a third person at hand."

SOCIOLOGY AND GYNECOLOGY. The Society's interest in sociological problems, to judge from recent volumes of the *Transactions,* does not evince itself to the extent of half a dozen papers in a dozen years. These are of a limited range, dealing chiefly with venereal diseases and prenatal care.

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Henry Newman drew our attention to the need of action last year. Our final act was to empower the Council to promote this movement. This promotion should be by action rather than words. We begin tonight by getting advice from authorities on the subject. Geddes, physician and ambassador, deplores the fact that doctors in general lack the spirit of citizenship. Otto Geier, prophet of industrial medicine, has drawn attention to the absence of medical men on the great recent commissions. We—a hundred and fifty thousand of us—men learned and otherwise—have scarce a representative in Congress. Except for work among ex-soldiers our Federal Health Service is starved; our feeble attempts to obtain a Cabinet officer are fruitless. France in her recent election placed forty-one doctors in her legislative branch, which equalled the quota of the agriculturalists and nearly that of the industrials. England has won her Ministry of Health. We are beginning, when Iowa really assumes the burden of illness and cuts the corners to do it, and when Wisconsin is spreading clinical instruction throughout the state. Midwifery can claim to have made a fair start, as we shall hear tonight. What gynecology should undertake in the way of preventive work we shall hope to hear from the author of the new text-book on industrial hygiene, Colonel Mock, whom many of you will remember, one of the most effective men on the Surgeon-General's staff during the war.

From among the strictly technical social problems that are in our hands a few instances may be given. Is there a simple method of preventing propagation among women who are idiots, epileptic, hopelessly insane or incurably criminal? Does the cautery-tipped sound produce an effective stricture, passed into the uterus to the tubal opening? Is Cary's new test safe and sufficient, wherein, with the patient in the knee-chest posture, sterile fluid injected into the cavity of the uterus disappears if the tube is patent and not otherwise?

At the opposite pole from sterilization, with its enormous potentialities of betterment of the race, is artificial impregnation. It is a field almost unstudied. Dublin proposes to open

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the abdomen after a few months of sterile married life, and Boston and Brooklyn do so without trial of this simpler means. This procedure is an excellent instance of the need of collective experimentation, since no one man is likely to have a large experience.

Another of the distasteful subjects we naturally shirk is contraception. What serious study has ever been made bearing upon the harm or harmlessness of the variety of procedures or concerning the failure or effectiveness of each? Who has or can acquire any considerable body of evidence on these matters but ourselves? What, indeed, is normal sex-life? What constitutes excess or what is the penalty for repression in the married? Do we still have to hark back to Luther for an answer? It will take a few professional lifetimes of accredited histories to gather evidence to submit, but some time a start must be made.

SIMPLER LIVING. What about standards of living? There was a man named Tarnier, honored beyond most men in our craft. He lived and saw his patients in a modest apartment up three flights of stairs. There was a host of men of a nation whose chief genius gave the Society its motto—a nation possessing beyond others the infinite capacity for taking pains—and these teachers and students of the modest life, by their scientific product, put us to shame. In our land the doctor must be a failure who has not car and clothes as good and house and habits of the class of his best patients. Sessions for pure science must be housed in palatial hotels. It costs $3 a meeting to belong to the New York Obstetrical Society. A whole house for a doctor with offices busy for one work-hour in four is the custom in most of our towns. This is a formula which any business would condemn. Little wonder that the pace is such there is scant time for study or clinical travel. The younger man cannot voice the protest. It is for us of the senior group to voice and act out a protest against overweening costs of practice. There could hardly be a greater disservice to science than to appear to give sanction to the dollar-gauge on achievement.

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Gynecologic Centers. What should one do with a collection of charts and slides and models accumulated through nearly ly forty years? A college needs only teaching material—that is, a relatively small amount of carefully selected illustrative material. Books are welcome to the medical libraries, which wisely distribute them. So also with the great copperplate editions. But the fine original drawings that publishers of medical magazines and books accumulate are in time destroyed. Many of them are masterpieces of technic. In the home of the College of Surgeons here in Chicago or in the museums which Washington, Boston and Philadelphia possess the casts and specimens may be taken. But the libraries and museums have not sensed the need or else have not the room for a slide library or a chart-and-drawings collection. Think what a saving it would be if you or I, in expounding our epoch-making discoveries, could get, as introductions to our subject, all the best standard pictures for the asking. Furthermore, in each large city there should be a studio attachment of a simple kind to library or museum where the medical author and his artist can work.

Sex Instruction. Parts of sex instruction belong to us, and we may well be chief counsellors in the determination of the details of this curriculum. The subject comes forward at this time, but I may here merely say that I do not see how the man in our line can escape the responsibility for imparting certain portions of this teaching himself or else seeing to it that the family doctor or visiting nurse undertakes these. To the mother, in order to forestall the gonorrheal vulvitis of infants, book-teaching without demonstration is insufficient. This also applies to the prevention of vulvar irritations and watchfulness lest the normal degree of auto-erotism go beyond bounds. To the young man and young woman, separately, a few days before marriage, who shall speak, and cover by instruction and warning those things concerning which our patients make this bitter and merited reproach, "Why did not someone tell us in time?"

Furthermore, an authoritative pronouncement is overdue

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bearing on the necessity of certain routine pelvic examinations. Concerning the prevention and early detection of cancer by this means, we are actively educating the profession. We may advocate not only routine pelvic examination before marriage but a physician's certificate, and in time will require that the certifier have specific qualifications to have his paper honored. The premarital test can include fitness for maternity. Next would come routine preventive care by the examination of one's patients in the second month of pregnancy to forestall a large number of needless miscarriages. Before admission to certain forms of heavy work certificates based on examinations will one day be an accepted practice. All these are samples of gynecology at work in prevention instead of patching. We should be the counsellors to whom social workers turn, but we need to take thonght in order to get ready with the answers.

JOURNAL. As an example of the type of concrete and visible activity on the part of the Society there may be instanced the initiation and responsibility for the editorial conduct of a technical journal. With a just proportion of the members of the editorial board named by this Society its standing is sure to be high, and free from detrimental influence.

TEXT-BOOK. As the Society may wisely have under its auspices a periodical, so it may foster the publication, in book form, of approved principles and practice and the necessary basic facts on which these are built, provided an adequate text-book is not produced or producible under the ordinary conditions of free competition. The Army set us the example. It is held by Holden that a satisfactory students' manual, containing all that is desirable to teach him, should be very fully illustrated and have many cuts in color. Such expenditure is declined by publishers because the sale may not extend far beyond the writer's own classes. A manual brought out and approved by several prominent teachers, and known to have the endorsement of the Society, will be remunerative, even though kept up to date.

CERTIFICATION OF SPECIALISTS. This Society in its yearly meetings is the great clearing house for ideas and the greatest annual stimulus most of us get withal. But if it is the desire

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of the membership to exert upon the practice of gynecology and obstetrics the widest possible influence it will start now to lead in that certification of specialists. Our survey will demonstrate which institutions have outfit and output of such high grade that their graduates may be endorsed. Our standards will automatically test and our publicity of end-results scale their workers, and though we err often in method or man, it is surely only by trial and openmindedness that we can effect any progress.

Such certification should have its time limit and be renewable, let us say, every ten years. Even membership in this Society might be predicated on worthiness, not past, but present, with proof forthcoming every decade. What evidence has the State that my degree of thirty-eight years ago still keeps me fit in character and knowledge to practise medicine?

Women in Obstetrics and Gynecology. "Men and their trades unions," says Macassey, "have always been singularly successful in staking out their claims to the most highly remunerative classes of work, around which they have erected impenetrable barriers against the entry of women." Though we older doctors have seen our hospital wards humanized by the exaltation of the woman nurse and giving her control, we have refused to give her any real opening to qualify for the inside of the barrier by declining free access to internships and to assistant and associate positions. The limited exception is to be found in England, where, in Euston Road and the Royal Free Hospital for Women, Mrs. Scharlieb and her followers have made good in major work, and, in the latter, alongside of men. If American women in their own medical colleges have suffered the inevitable consequences of inbreeding the responsibility is with the men. "British women in industry," to quote Macassey again, "seemed temperamentally immune to the deadening influence of monotonous work, to which men are peculiarly susceptible. Paradoxically enough, when the work required constant alertness, a sure deft touch, delicacy of manipulation—in short, a combination of quick intelligence and manual dexterity within a limited ambit—women were invariably superior to men." One would think Sir Lindley was

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describing qualifications for laboratory service, for dispensary or office treatment, for most of our operative technical craftsmanship. If his statement were applicable to American women, what a field for skilled associates, leaving us lords of reaction free for unlimited ambits! And what a chance to secure constant consideration as human beings of people recommended for operation. Think of tight-lipped surgery with a tender heart!

By the way, are there no women who of right should be members of this Society?

TRAINING OF LEADERS. The shortage, commented upon last year, of men in our line who are of the caliber to head large services and to fill important teaching positions of the first and second ranks is merely a striking instance of a condition that is general. The war mercilessly exposed the relative smallness of the number of men of the highest grade of ability in the profession. That it did the same for every other profession and business is scant comfort or excuse. The important thing to note is that some of the reasons are removable. Thus, as an example, only one surgeon in four of the full-time surgeons in the army reported himself as having a hospital appointment, and among the physicians only one in 28 had any hospital connection! This 14,000 first admitted to the army from civil practice ought to represent a cross-section of the men in active practice in the profession (125,000). It should err on the favorable side, as there were 28 per cent. rejections. After acceptance the full-time surgeons were grouped into classes. The grouping was based on first-hand knowledge. Class A comprised men of the capacity of chiefs of large city clinics, able organizers and instructors; Class B first assistants able to assume the chief's duties. Among the 14,000 there were as follows:

	Per cent.
Full-time surgeons (self-reported), 2884	20.7
Full-time surgeons (self-reported), with hospital appointment	4.88
Class A surgeons	1.44
Class B surgeons	2.16
Medical men with hospital connection	2.11

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This paucity of numbers to draw from must be remedied. This lack of leadership material must be met by developing to the utmost what training facilities we have until new resources take form. It cannot be a matter of indifference to this Society, therefore, and is a matter of no little concern to all workers in this department, to make sure that America's well-equipped teaching clinics are ably manned and working to full capacity at the job of selecting and drilling the future teachers and investigators in gynecology and obstetrics. Our survey will demonstrate the facts. Publicity will do the rest.

PROGRAM. Here is a dream of a four-year program for the Society, carrying out some of the visions of these wandering conceits. To be realized, they need but men and money and the driving force of an idea and flexibility.

FIRST YEAR:

New journal under auspices of the Society.

Propositions for and action on those standards immediately required, such as details of the business of a typical meeting for the weekly or monthly staff review of casualties.

Self-report by chief clinics, and on large cities. Report on participation in sociological program. Tentative nomenclature of operations.

SECOND YEAR:

Report on colleges and obstetrical-gynecological services in general.

Report on women in gynecology and obstetrics.

Index of obstetricians and gynecologists looking toward certification.

Standard methods, histories, indexes submitted for criticism or endorsement.

Students' manual.

Nomenclature of diseases and injuries and operations.

Participation in public health movements affecting women, with recommendation based on these.

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THIRD YEAR:

Publication of surveys and standards.

Publication of a best type of each form of service, private, out-patient, large and small; hospital, big and little.

Plan for education of general practitioners at their homes in every-day gynecology.

Yearly paper on social or industrial subjects.

FOURTH YEAR:

Certification of specialists.

To me this seems an inspiring program, and, with it, whether carried on by us as individuals or by the Society, whether driven swiftly or slowly, the security of our future would seem to be assured.

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ANALGESIA AND ANESTHESIA IN LABOR

By Edward P. Davis, M.D.
Philadelphia, Pa.

At the present time much discussion is given to analgesia and anesthesia in labor. The commercial exploitation of so-called twilight sleep drew the attention of the public to this subject. When the true value of this method was appreciated, and it was relegated to its proper place amid the resources of obstetric science, the attention of the profession was engaged by the advocates of the use of nitrous oxide and oxygen in labor. At present the claim has been made that no patient should pass through labor without a thorough and painstaking effort upon the part of her medical attendant to relieve suffering and avoid exhaustion. This claim must be acknowledged to be just and fair, but in the effort adequately to meet it discrimination should be exercised.

That actual suffering occurs during labor, and that this suffering is the same as that endured during surgical procedures accompanying wounds and lacerations or under other conditions where nerve filaments are irritated, there can be no doubt. The effort to consider suffering in labor as righteous and inevitable was dissipated by Queen Victoria. It will be remembered that when Simpson proposed to give her chloroform in labor the bishops of her church forbade because pain was decreed in Scripture as the necessary accompaniment of childbirth. The Queen replied that none of the bishops had ever had a baby and that she had passed through this experience, and that her experience should

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decide, and so it did. She was among the first to receive the benefits of anesthesia in labor.

However fully we may accept this claim, may there not be at present a tendency to fall into error in the neglect of the physiology of labor and Nature's methods to relieve the patient from unnecessary and undue suffering and exhaustion? From our own observation pain in labor is important in direct proportion as it leads to exhaustion. The fact that physical pain occurs during parturition is met by women of strong maternal impulse as the inevitable price paid for offspring, and it is borne by them with courage and patience so long as progress is made. When, however, progress lags and exhaustion threatens, pain passes the limit of physiology and becomes a pathologic condition.

Nature's provision for the relief of suffering in labor is much more successful during the stage of expulsion than during the first stage. In the beginning of labor a test is made of the nervous condition of the patient. Nagging pain of uncertain duration and without apparent progress disturbs rest and sleep and, with nausea, makes a most distressing condition which may seriously retard parturition. For the relief of this Nature has no remedy except the vigorous condition of the patient and her preoccupation in such domestic matters as may divert her attention. In modern life vigorous women are not common, and domestic affairs which may divert the attention of the patients from labor are frequently more complicated and worse than labor. As a result, many cases of parturition pass from the natural to the pathologic because of the tedious and neglected first stage of labor. The best cure for the abnormalities of the first stage of labor lies in the hygiene of pregnancy. If a woman can be brought to labor with sound nerves and muscles a great gain has been made. If she can be under the care of an experienced and able nurse, and if she has the natural maternal ambition and instincts, the first stage of labor may often be passed successfully without the use of drugs. The copious and thorough irrigation of the lower bowel will do

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something to mitigate nagging pain. The frequent emptying of the urinary bladder, the necessary preparation for labor, moving about and occupation, will all help to pass daylight hours. The healthy woman may doze during the first stage of labor at night and very often she is unable to sleep, and failure of sleep is a good preparation for exhaustion. Here in many cases analgesia is demanded and its proper administration is of great value. It can be said that the woman will be prepared for labor in proportion as she has avoided toxemia in her pregnancy and has practised well-regulated exercise in the open air. With this background, if sleep is denied her during the first stage, she rightly demands relief. It is evident that the merits of the so-called twilight sleep lay in the psychic control of the patient and in the hypodermic use of morphin. While the former is difficult at times outside of hospital the hypodermic use of morphin, preferably with atropin, is usually possible. With unruptured membranes there is little evidence that this injures the fetus, nor does it seriously delay labor. In the presence of nausea a drug hypodermically given is promptly and efficiently absorbed. Dissolved in various forms it tends to promote dilatation of the cervix and the combination is a reliable and efficient one. The proved objections to scopolamin or hyoscin are the uncertainty of action which may become exciting and its uncertain influence upon the fetus. In our experience a moderate dose of morphin and atropin has never acted unfavorably upon the child. In one case of excessive nervousness, with tedious dilatation of the os and cervix in a neurotic multipara suffering with a mild bronchitis, the hypodermic use of codein through two nights and three days seemed to produce a condition of mild asphyxia in the child. This, however, did not prove serious and the child was readily made to breathe. In cases in which patients are admitted to hospital threatened with rupture of the uterus through impacted fetus and violent uterine contractions the hypodermic use of morphin may be necessary until operation can be performed. We have as yet seen no positive evidence that such use of morphin injured the child.

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Formerly hydrate of chloral was used with great freedom during the first stage of labor. Some applied it locally upon cotton to the cervix, as it was supposed to have a peculiar property in promoting dilatation. When the dangerously depressant effects of this substance became familiarly known its use was greatly curtailed.

During the second stage of labor we believe that an opportunity should be given for the patient to establish the normal physiology of the expulsive operation of parturition. This consists in muscular contraction reaching the crest of its wave energy, followed by a gradual cessation and relaxation, and this to be succeeded by a period of absolute rest and often sleep. If the pulse and pulse tension of the patient undergoing this phenomenon be observed they are found to be surprisingly normal. There is no evidence of exhaustion, and it is questionable whether it is well to seriously disturb this condition by anesthesia. There can be no objection to brief anesthesia at the point of greatest muscular activity, provided the conditions are such that the patient, if it were necessary, could be promptly delivered. If, however, the conditions are unfavorable for prompt delivery through the vagina the patient may insist upon anesthesia and abandon all efforts to help herself in labor.

Pressure upon the pelvic floor is painful in proportion to the lack of development of the genital tract, the size and consistence of the presenting part, its position and presentation and the condition of the nervous system of the patient. Unquestionably at this stage of labor anesthesia should be available and usually employed. Here those who urge the use of nitrous oxide and oxygen believe it to be a specific. Our experience, however, has not led us to subscribe to this somewhat enthusiastic claim. In our experience nitrous oxide and oxygen is not a stimulant but is an anesthetic and asphyxiating agent. Its merit consists in its easy inhalation, its comparative safety, and the prompt recovery of the patient. It does not lessen the vigor of uterine contraction nor does it seriously affect the fetus, nor is it a stimulus of muscular and

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nervous action. In some patients it produces a condition of excitement which is undesirable and it cannot be trusted if the anesthesia is to be carried to the surgical degree for forceps, version or embryotomy. With a preliminary hypodermic injection of morphin it may be used for abdominal section. While the apparatus necessary for its administration is comparatively simple it is more cumbersome and complex than the can of ether and the gauze or simple inhaler necessary for etherization. While we recognize fully the value of nitrous oxygen in labor we should not be willing to keep a patient under its influence continuously for five or six hours, nor should we be willing to depend entirely upon it in all cases of parturition.

The best quality of ether skilfully administered is successful in the majority of cases of spontaneous labor during the second stage. If given at the height of the pain, quickly removed as soon as the pain subsides, it stimulates and does not retard labor, but the moment when expulsion occurs a few deep inhalations without air will render the patient insensible to pain, although capable of comprehending sensations of feeling, of hearing or often of sight. The mother arouses easily after delivery and requires no anesthesia while the placenta is separating. For the insertion of stitches immediately after labor, ether properly administered with oxygen is comparatively safe and efficient. We have seen no evidence that such use during the stage of expulsion injures the fetus. It is true that ether is inflammable, that some patients are excited by it, that it is irritable to the bronchial tubes and kidneys and that it is difficult to anesthetize some patients with ether; but if skilfully administered it is usually successful and its combination with oxygen renders it in our experience the safest of obstetric anesthetics.

For the immediate closure of lacerations it must be remembered that all parts of the genital tract are not equally sensitive. There is not much sensation in the cervix nor is there great sensitiveness in the pelvic floor. In the skin perineum, especially near the anus, the insertion of stitches

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causes acute pain. If these facts are borne in mind anesthesia may vary during the insertion of stitches in accordance with the needs of the patient.

The comparative merits of nitrous oxide and oxygen and ether and oxygen were exemplified to the author in a recent experience. A multipara was suffering from a hepatic toxemia; while her urine remained comparatively free from albumin and casts the ammonia percentage was rising steadily and so was the percentage of creatin and creatinin and rest nitrogen. Vomiting was incessant and uncontrollable; the action of the heart was increasing in rapidity. As viability had been reached it was deemed necessary to induce labor, and for this purpose it was suggested that to anesthetize the patient with nitrous oxide and oxygen would be useful. A careful physical examination of the patient revealed the fact that the second sound of the heart had disappeared and that the heart was acting badly. There was no asphyxia, but cardiac dilatation seemed threatened. The anesthetizer wisely declined to use nitrous oxide and oxygen, stating that in his experience a similar patient had suddenly died during the administration of the nitrous oxide and oxygen while preparations were made to induce labor. Ether and oxygen were then given and labor was induced. After two hours of ineffectual pain, with continued vomiting and bad heart action, it was believed imperative to deliver the patient. Accordingly, ether and oxygen were again administered, dilatation of the cervix was completed by the gloved hand and the child delivered living by forceps. The action of the heart improved under the anesthetic, and with the aid of vigorous stimulation hypodermically the patient recovered from her labor. It seemed to us that in this case we were practically limited to ether and oxygen. Chloroform was prohibited by the hepatic toxemia present and also by the condition of the heart.

Patients sometimes express a decided preference for a given anesthetic in labor. Thus in the writer's experience a patient was given nitrous oxide and oxygen for the induction of labor, and when the stage of expulsion arrived it was necessary to

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deliver her by forceps. Nitrous oxide and oxygen were again administered but failed utterly to anesthetize the patient, and ether and oxygen were substituted. On recovering from her labor the patient made a very earnest request that nitrous oxide and oxygen be omitted in her future obstetric experience.

Chlorid or bromid of ethyl is in use by some for patients in labor. They are easy of administration, pleasant to many patients, uncertain in action, causing in many cases considerable excitement and disturbing the action of the heart. Their use must be exceptional.

It is unnecessary in this presence to draw attention to the fact that modern studies in toxemia have practically debarred chloroform as an anesthetic in many cases of labor. Acute acidosis, acetonemia, acetonuria, relaxation of the uterus and postpartum hemorrhage have all followed the use of this anesthetic. At one time considered the ideal anesthetic for obstetric use it is now in this country less and less frequently employed. Diluted with cologne of good quality it makes an exceedingly agreeable mixture for the patient, but uncertain in action and of doubtful value.

In the experience of the writer the combination of oxygen and ether has proved remarkably successful in parturient women suffering from cardiac, respiratory or nephritic conditions which formerly demanded the use of chloroform. The writer has recently had occasion to operate upon a number of pregnant tuberculous women in various stages of pulmonary tuberculosis and has employed this anesthetic with little irritation and good after-results. In one consumptive woman whose case was complicated by valvular disease of the heart, abdominal section proceeded smoothly and the patient made an uninterrupted recovery. It is the practice of the writer to require the administration of oxygen with ether in all obstetric operations.

The subject of analgesia and anesthesia in labor is so intimately a part of modern obstetric science that it may not be amiss to call attention to the fact that modern obstetric diagnosis has considerably limited the indiscriminate and

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dangerous use of anesthetics during labor. Formerly prolongation of labor was considered a valid indication for analgesia and anesthesia, but in some of these cases accurate diagnosis was wanting. The patient with a contracted pelvis and disproportion might be drugged for several nights and days in the belief that labor must ultimately proceed successfully. Finally the discovery would be made that a radical operation was necessary after the patient is brought to face this problem injured by indiscriminate analgesia and anesthesia to which she had been subjected. So too the indiscriminate use of drugs in labor in patients whose toxemia had not been recognized has aided in numerous fatalities. We are quite aware of the danger of the indiscriminate use of drugs which cause violent uterine contraction, such as ergot and pituitrin, especially when no accurate diagnosis of the conditions present has been made. But is there not an equal danger in the indiscriminate use of drugs to produce analgesia and anesthesia when an accurate diagnosis of the obstetric conditions is wanting.

In the matter of diagnosis, nitrous oxide and oxygen may be exceedingly valuable. For thorough examination of nervous patients, for minor manipulations, such as the introduction of bags or bougies, or the introduction or removal of gauze packing, or the opening of a breast abscess, or for other possible conditions in which a brief and not complete anesthesia is necessary, nitrous oxide and oxygen may be of great value. In inducing labor the writer is accustomed to employ these agents, thus enabling him to dilate the cervix somewhat with the gloved hand, to separate the membranes from the lower portion of the uterus and to introduce from one to three bougies without resistance and suffering upon the part of the patient.

The subject of analgesia and anesthesia is of peculiar value to the obstetrician, but in the consideration of anesthesia he shares with the surgeon the study of modern conditions. Unquestionably the administration of anesthesia is properly today a specialty of surgery in all its branches. The modern anesthetizer should be prepared to use nitrous oxide and

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oxygen, ether and oxygen, chloroform with or without oxygen, changing if necessary from one to another of these during a prolonged operation. In special fields of surgery the invention of special apparatus has made anesthesia vastly more accurate and successful. In obstetric anesthesia we believe that the mother is of too much importance to be given to the average trained nurse or average hospital resident, and that even in spontaneous parturition the services of a skilled anesthetist should be demanded. The remarkable success of women trained for this purpose introduces into obstetric practice an element which is agreeable to the patient and of great value to the physician. The patients should be assured when they engage their physician that special attention will be given to the lessening of suffering and the avoidance of nervous exhaustion. They should be promised such relief as modern obstetric science affords in all cases, but the physician should insist that he or his anesthetist should decide upon the agent to be employed.

Economically speaking this will increase the cost of parturition, but this will be more than compensated by the lessened exhaustion of the mother, her more prompt recovery, the lessening of hospital days and a better resumption of domestic or other economic duties. For the obstetrician, analgesia or anesthesia, skilfully given, makes for more accurate diagnosis during labor, and for the successful management not only of spontaneous and normal parturition but of complicated conditions.

It is a familiar fact that recovery from parturition is greatly delayed by exhaustion during labor. In this regard modern analgesia and anesthesia is one of the greatest advances made by modern obstetric science.

One must not forget the considerable fetal mortality and morbidity produced by prolonged birth pressure and by unregulated and violent expulsive efforts. The danger of asphyxia to the fetus during labor by analgesia and anesthesia is vastly less than the danger of cerebral or other hemorrhage from birth pressure, and the avoidance of this latter complication is greatly enhanced by obstetric analgesia and anesthesia.

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DISCUSSION

DR. CARL HENRY DAVIS, Milwaukee, Wisconsin.—It is a pleasure to be asked to open the discussion on Dr. Davis' paper, especially since it strikes a conservative note. Dr. Davis and I fully agree in all but one particular. So far as the value of analgesia and anesthesia in obstetrics is concerned, my opinion regarding the relative merits of inhalation anesthetics in obstetrics is the same today as stated in 1917 in the three papers read that year before the Chicago Gynecological Society, the American Association of Anesthetists, and the American Medical Association. My conclusions may be found in those three papers[1] as published in the current medical literature.

My early experience in obstetrical anesthesia and analgesia was largely with chloroform and ether. Nitrous oxid-oxygen was rarely used except when other anesthetic agents were contraindicated. I have used no chloroform since 1909. I believe that I have tried ether in all suggested manners. During the past few years I have used nitrous oxid-oxygen analgesia as a routine in obstetrics. The results with ether, whether given by drop method or vaporized with air or oxygen, were in no way comparable with those usually obtained with the nitrous oxid-oxygen analgesia. With Dr. Davis I agree that nitrous oxid-oxygen should not be given continually for a long period. I first called attention to the possible dangers of the long-continued analgesia in 1917. When it is given intermittently it has a distinct value over ether in most cases, because it is quickly absorbed and quickly eliminated. Ether is very slowly eliminated. It has cumulative effects on mother and child. It weakens the uterine contractions and frequently causes nausea and vomiting. When the first few whiffs of ether are given to an obstetrical patient we substitute something which may be worse to her than pain, and given at the culmination of the contraction it usually surprises and quiets the woman. After a few inhalations she gets the cumulative effect and a definite relief of pain.

[1] Am. Jour. Obstet., New York, 1917, lxvi, No. 4; Am. Jour. Surg., 1917, xxxi, Anesthesia Supplement, p. 98; Surg., Gynec. and Obstet., 1918, xxvi, 170.

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Ether, unlike chloroform, stimulates both respiration and circulation. A patient taking ether with air never has cyanosis because of the ether, and since it does not reduce the amount of oxygen in the circulating blood, I fail to understand why ether given with oxygen can be so much safer in cases of toxemia than ether given with air. Oxygen with ether does not change the physiology or lessen the irritation to the kidneys. The safety of both ether and chloroform may be increased by the administration of alkalies before delivery and after. The photominographs which I am passing are from my research on chloroform, ether and nitrous oxidoxygen published in 1917.

Recently I have been using nitrous oxid-oxygen analgesia intermittently for mid- and low-forceps deliveries as well as in normal labor.

The nitrous oxid-oxygen is given to a deep analgesia or light anesthesia while the forceps are applied. The mask is then removed, and thereafter the gas administered intermittently as the normal labor. The patient is instructed to bear down during contractions, while gentle traction is made on the forceps. For primiparæ I do a primary posterior episiotomy. There is usually an easy delivery with a minimum of traction pressure on the head. I cannot accomplish this coöperative type of delivery with ether, regardless of its administration. In my experience, nitrous oxid-oxygen has proved to be the most satisfactory inhalation analgesic for both normal and operative obstetrics. If a long-contined anesthesia is required, I use ether.

DR. W. FRANCIS B. WAKEFIELD, San Francisco, California.—I feel that Queen Victoria's remark to the bishop applies a little bit to what Dr. Davis has said. I have striven for the last five or six years in San Francisco to make a very honest effort to relieve women of the pain of childbirth. I have used scopolamin anesthesia in all my private cases and have reached the number now of 700 cases. My obstetrical practice is relatively small and confined entirely to private work. I have no clinical practice in obstetrics, so that scopolamin is used entirely on the higher class of women of the city. I have found scopolamin as an anesthetic an absolutely perfect therapeutic agent, and it is discouraging to a man who has used it as honestly and as faithfully as I have done with such gratifying results to have men

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like Dr. Davis, Dr. Williams, and others relegate this thing to the background as a perfectly useless therapeutic agent.

I do not know why it is that the use of scopolamin has been unsuccessful in the hands of many men. I believe it is because of bad preparations of the drug that have been used. Scopolamin except in fresh solutions from the original crystals that have been carefully preserved from disintegration, or in the form of ampules, is useless.

In tablet form I consider scopolamin almost useless as an anesthetic, and oftentimes injurious, because any exposure of the scopolamin crystals to air will injure its therapeutic effects and produce a wild delirium instead of a somnolent effect.

There is nothing psychic about my use of scopolamin. The patient is under more or less profound anesthesia from the time labor pains become regular until the child is born. No other anesthetic is used at all in labor except during the last half a dozen pains, when nitrous oxid and oxygen are used in conjunction, and invariably my patients go through labor without any reaction, without any pain whatever, and I consider a therapeutic agent that will produce this result without any harm to the mother or child is worthy of consideration, and should not be carelessly relegated to the background.

The San Francisco *Examiner*, not very long ago, came out with an article in which Dr. Williams was credited with saying that it (scopolamin) had been tried and found wanting. Now, that may be perfectly true with Dr. Williams' experience with it, still it gives a bad impression to the general public and undoes very largely the work of others who have had great success with the use of this drug. Scopolamin, properly used, with proper preparation of the drug, is a valuable therapeutic agent; in fact, one of the most valuable I have used in my professional practice.

DR. CHARLES E. PADDOCK, Chicago (by invitation).—I would like to ask Dr. Wakefield some questions. He states that he uses scopolamin-morphin. He tells us that he has had 700 cases. Does he mean that he has used it in every case? When does he begin the use of it, at what stage in labor, and what are the dosages that he gives? Does he give it regardless of pain, and has he had any asphyxiated babies? Can he use scopolamin-morphin without an additional anesthetic?

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DR. JOHN O. POLAK, Brooklyn, New York.—As usual, Dr. Davis has presented a conservative paper, but we do not think it is fair for him to condemn morphin and scopolamin, though his caution regarding the indiscriminate use of these anesthetics is well taken.

There is no doubt in the minds of all obstetricians that anesthesia in labor is a necessary adjunct; in order to give our patients the test of labor it is necessary to relieve some of their suffering—particularly is this true in the nervous type of patients that most of us are dealing with, and we can do this better with a combination of scopolamin and morphin than with morphin and atropin. The effects depends on how we use it and when we use it. In our clinic it is a routine first-stage procedure. We do not try to get amnesia except in a limited number of instances. But we get some degree of analgesia, and the analgesia holds over so that these patients, during the dilatation stage, have full action of their uterine muscles, hence can complete the second-stage mechanism which Dr. Davis says is so necessary. When the fetal head reaches the pelvic floor, and during the perineal stage anesthesia is again necessary, whether the delivery be accomplished by episiotomy, prophylactic forceps or by nature. Of this stage we have found, after a considerable experience with nitrous oxid-oxygen, that ether and oxygen is the safest and best anesthetic.

One point that I would like to make in closing is, that we discontinue the anesthetic after the delivery of the child and allow the patient to come out from her anesthesia before any reparative work is done. This allows the uterus to contract and minimizes the bleeding. When retraction is firm, anesthesia is continued for the repair of pelvic injuries.

We have not had any postpartum hemorrhages since we have divorced the anesthesia of labor from the anesthesia of repair. I trust I make myself clear on this point.

DR. JOSEPH L. BAER, Chicago (by invitation).—I should like to subscribe almost without reservation to the views of the essayist.

My first experience with nitrous-oxid anesthesia dates back to 1904, at which time, as a member of the house staff of the Michael Reese Hospital, I was sent to Wesley Hospital to watch Dr. Weller Van Hook do perineal prostatectomies under nitrous

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oxid. We then started using it at the Michael Reese Hospital, and for several years I was official anesthetist, during which time I gave many hundreds of nitrous-oxid anesthesias for abdominal surgery.

In obstetrics I believe the only place for nitrous oxid-oxygen is in the second stage of labor, before the end, and only with such women as cannot be controlled by the presence of the accoucheur, who is coöperating with his patient during her second-stage contractions. My view is, if the accoucheur is with his patient and steadies her, so to speak, she will be very much better and will usually choose to do without anesthesia during the second stage until near the end, at which time I rather prefer ether to nitrous oxid. The patient is usually controllable under light ether anesthesia for the purpose of actual delivery, and is not always controlable under the nitrous oxid-oxygen.

During the first stage I use almost entirely, if I use any combinations, morphin hypodermically and chloral hydrate per rectum or by mouth.

A word as to scopolamin. When "twilight sleep" swept over the country, we at the Michael Reese Hospital decided to give it a thorough trial. My article published in 1915 dealt with a series of 70 cases and was for us a conclusive answer, and we have discarded its use in obstetrics.

DR. BENJAMIN P. WATSON, Toronto, Ontario, Canada.—I think one of the very important things which Dr. Davis told us in his paper was that we should be particularly careful of the patient during her pregnancy. If one can see a patient frequently during the course of pregnancy and gain her confidence and be with her for some time at the commencement of labor, one can do a great deal to help that patient in her labor and stave off the administration of any anesthetic for some time at any rate. On the other hand, there are patients to whom one must administer some form of anesthetic in the first stage of labor.

I am entirely in accord with those speakers who have upheld the use of scopolamin and morphin. We use it frequently, but never before giving the patient a chance to go through the first stage without an anesthetic. I think it is a mistake to administer drugs as a routine, when a certain stage of dilatation of the cervix has been reached; but if the patient is getting worn out, is

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fretful, and not bearing pain well, in morphin and scopolamin, or in the hydrobromate of hyoscin, we have valuable drugs. It has been my experience that, with a preliminary dose of $\frac{1}{8}$ gr. of morphin and $\frac{1}{150}$ gr. hyoscin hydrobromate, there is no bad effect on the mother or child. The morphin is not repeated, and if the hyoscin hydrobromate is repeated it should be given in from $\frac{1}{300}$ to $\frac{1}{400}$ gr. dose. With that administration we usually have to give some general anesthetic toward the end of the second stage. We have used both nitrous oxid and oxygen and ether, and personally I trust to the administration of ether toward the end of the second stage of labor. I have seen no bad effects from morphin-hyoscin administered in the manner I have mentioned.

Dr. Ralph H. Pomeroy, Booklyn, New York.—I urge upon this Society to recognize, from the nature of this paper and discussion thereon, that we are neither seeking nor expecting to find a fixed and standard process of drug administration for the relief of distress in labor.

In order to meet the psychology of satisfaction on the part of the patient the obstetrician must be convinced, when she is through with her labor, that she has not had a terrible experience. If we are to meet that requirement at all we must recognize that there is no fixed order of administration of these analgesic and anesthetic drugs which can be standardized. Furthermore, we must understand that labors cannot be standardized, and that we must possess equipment, knowledge and experience in order to apply to variations of labor, and to variations of temperament and physical condition, an adaptation of our knowledge and equipment appropriate to the psychology of satisfaction for the individual patient. Any organization or hospital, or any teaching staff, that does not recognize the usefulness of various combinations of morphin, scopolamin, nitrous oxid gas, ether and chloroform, worked out with reference to the individual case, is missing the greatness of this subject.

Dr. Edward P. Davis, Philadelphia (closing the discussion).—May I suggest to Dr. Carl H. Davis that in his last statement relative to analgesia and nitrous oxid-oxygen in low forceps he got into an entirely different topic, which will be discussed by Dr. De Lee in a later paper.

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Have we come to the point in obstetric science where natural spontaneous labor is not to be expected, and should we substitute an artificial, more or less surgical, procedure for every parturition? If so, then nitrous oxid-oxygen anesthesia and low forceps is a surgical procedure, and the anesthesia is only a small part of it, and Dr. Davis has gone a little further than my paper went. I have nothing to say on that point except to bring up the question, are we going now to consider sharply that position? Are we or are we not taking that position concerning parturition?

As regards scopolamin, which is used by our member from San Francisco (Dr. Wakefield), I was very much interested in hearing his experience. Most of us are not so situated that we can obtain absolutely pure drugs in this part of the world, and the importance of furnishing absolutely pure drugs was shown by the German government and the German manufacturers, who instituted propaganda during the flowery days of scopolamin to give it by the mouth.

After hearing the discussion it is evident that there is a psychological interest exercised by the gentleman upon his patients. I envy him in that.

Regarding the remarks of Dr. Polak, it is always interesting to have him come out with something which seems good to him. It strengthens me. I think he is right in what he has said about labor and repair. They are not the same thing, and hence anesthesia should be different.

Dr. Baer in his conservatism comforts me also, and I am glad to find that even in the stimulating atmosphere of Canada Dr. Watson finds ether is a good anesthetic for women in parturition.

As regards Dr. Pomeroy's remarks, he touched on a very important thing. After all, a woman in labor is approaching a supreme physiological test, and the damage to her being is psychological. She is at present the psychological entity of modern civilization. She cannot be considered *en masse*. There is no standardization, and hence we must approach the patient with the idea of helping her the best we can.

I leave seriously with you this one thing. I did not see that patient who died just as labor was being induced under nitrous oxid-oxygen. It was not my case. This woman had been given stimulation. She had been vomiting for some time. She was prepared for the induction of labor by stimulating her heart.

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It is the experience of anesthetists that a stimulated heart yields rapidly and fatally to nitrous oxid-oxygen. I may warn you, therefore, that if you attempt to anesthetize patients with nitrous oxid-oxygen who have been toxic, and to whom it is necessary to give stimulation, you may have collapse. She died under inhalation of the gas without the uterus being touched. It was such a warning that I have taken the liberty of bringing it before you.

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INDUCTION OF LABOR: INDICATIONS AND METHODS, WITH SPECIAL REFERENCE TO THE USE OF PITUITARY EXTRACT

By B. P. Watson, M.D.
Toronto, Ontario

The duration of human pregnancy is not known. All that we do know is that 280 days is the average time that elapses between the first day of the last menstrual period and the day of labor. This average we make use of in calculating the probable date of labor. At that time labor begins, or ought to begin, naturally. The essential factors determining the onset of natural labor are not definitely known, so when we wish to bring on labor at a time other than that set by Nature we have to resort to artificial means, some of which may be an imitation of Nature's method and some of which most certainly are not. It will be noted that the title of this paper is "The Induction of Labor," not the "Induction of Premature Labor," as is so often the heading of the chapter in text-books, for in my experience labor is induced just as frequently in postmature as in premature cases.

The present communication is based upon 150 cases from the public wards of the Toronto General Hospital under my care and from my private practice. In these, labor was induced on the following indications:

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Pregnancy toxemia	38
Pregnancy prolonged beyond calculated term	65
Small pelvis	25
Large size of head	10
Pulmonary tubercle	3
Dead fetus	3
Heart disease	1
Glycosuria	1
Anemia	1
Placenta previa	2
Hydramnion	1
Total	150

PREGNANCY CONTINUING BEYOND CALCULATED TERM: It must be remembered that we do not know the duration of human pregnancy. All that we do know is that the average time which elapses between the beginning of the last menstruation and the onset of labor is 280 days. This is often erroneously given as the duration of the gestation. But we have no certain knowledge as to when the ovum becomes fertilized, whether just after the last menstruation which the patient had or just before the first one that she missed. Recent statistics gathered from data obtained during the war from the wives of soldiers home on furlough indicate that pregnancy is most likely from cohabitation immediately after the menstrual period and least likely from that immediately preceding it. But this gives us little light of the duration of the pregnancy, for we know that the sperm cells may live as long as three weeks in the uterus and tubes. It is always more certain to calculate the date of labor from the first day of the last menstrual period rather than from the date of cohabitation, because our calculation, as I have said, is based upon the average so obtained.

The fact that a patient has gone beyond the calculated date is therefore not evidence that the child is postmature, and is not in itself an indication for the induction of labor. In arriving at the average we are dealing with cases with a possible variation of three weeks, and every now and again we are bound to have cases at either extreme. It is, nevertheless,

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our duty to watch carefully all patients who go over the calculated term and to examine for the purpose of ascertaining the size of the fetal head in relation to the pelvic brim. At the first indication of any disproportion labor ought to be induced. This will be indicated in a primipara by non-engagement of the head or by a head previously deeply engaged in the brim tending to become more mobile, and in a multipara by difficulty in pushing the head down into the brim. Multiparæ who have previously had large children and hard labors should not be allowed to go beyond the calculated date. It must be remembered that besides the actual increase in the size of the head in postmature infants there is a more advanced ossification which interferes with the normal amount of molding which is so important a factor in the mechanism of the second stage of labor. Some obstetricians advocate the routine induction of labor in all cases two weeks before the calculated term. While not making it a routine I have frequently so induced with excellent results. Another factor which must be taken into consideration is the inconvenience to the patient and her friends resulting from the continuation of pregnancy beyond term. The obstetrician's arrangements also are entitled to some consideration provided the method we use involves no risk to mother or child. Such a method we shall see later is available.

Small Pelvis: Pelvimetry ought to be routine in obstetrical practice. Every woman who engages a doctor for her confinement is entitled to expect that he will satisfy himself by actual measurement that she has a pelvis of an average size. This measurement ought to be made by the seventh month, so that if the pelvis be found to be small the advisability of the induction of premature labor may be considered. It is impossible to state in figures the degree of pelvic contraction calling for the induction of premature labor in preference to the other procedures. All that we can say is that the amount of shortening of the conjugate diameter must be slight. The value of pelvimetry lies in letting us know that we are dealing with a pelvis below average size and that we must keep a

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careful watch on the patient during the last two months of pregnancy. When we find by combined abdominal and pelvic examinations, according to the Müller-Kerr method, there is overlapping of the head over the pelvic brim when it is pressed down into it, labor ought to be induced, provided the pregnancy has advanced far enough to give reasonable hopes for a healthy child which will survive its birth. If this overlapping is present early in the seventh month the chances for the survival of the infant, if premature labor is induced, are slight, and it is wiser in such a case to wait until term and perform a Cesarean section. It is a mistake to set a definite date for the induction of labor in these cases of minor degrees of pelvic contraction. That date is only determined after repeated examinations of the patient at weekly intervals. To induce too soon is to risk the life of the infant; to induce too late is to be faced with dystocia. In this condition Barbour's dictum, "The child's head is the best pelvimeter," is specially applicable.

Large Size of Head: Here, again, it is not so much the actual size of the diameters of the fetal head as the relative size of the head to the pelvis. Given a pelvis of normal dimensions and a large head the problem is the same as in the case of a normal sized head and a small pelvis. The indication for the induction of labor is to be found in the difficulty of engaging the one with the other.

Pregnancy Toxemia: Systematic urine examinations and estimation of blood-pressure afford early opportunity for the detection of pregnancy toxemia, and when discovered early it is usually easy to treat. In a small proportion of cases improvement does not result, and in them induction of labor may be indicated in the hope of averting an actual condition of eclampsia. The indications of immediate danger are a high and rising blood-pressure (140 or over), small excretion of albumin-laden urine and the persistence of headache or failing vision. Persistence of all or any of these in spite of appropriate treatment calls for the termination of the pregnancy.

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The above constitute the great proportion of the indications for which labor has been induced in our series of 150 cases. The other indications indicated in the table call for no special mention at the present time.

Labor has been induced in these 150 cases by bougies, bag, quinin, pituitary extract and quinin and pituitary extract. As the indications for the induction of labor have become more numerous of late years and the wisdom of it has become apparent in a larger number of cases, so we have felt that non-mechanical means which expose the patient to no added risk from manipulation and sepsis ought to be employed if they are in any way effective. There are two drugs which have a marked effect in stimulating uterine contraction and stimulating it in a method which very nearly approaches the intermittent activity characteristic of normal labor. These two drugs are quinin and pituitary extract. This action of quinin has been known for a long time and it has been used in small doses for the purpose of stimulating uterine contraction during labor. Of late years it has been extensively employed in large doses for the purpose of inducing labor. The results obtained from it have been somewhat varied. This variation has depended upon the time in pregnancy at which it was sought to induce the labor and upon the mode of administration. We have found that much better results are obtained when the quinin is given in solution than when it is given in the powder form. We employ the hydrochloride of quinin and administer along with each 10 grains 10 minims of hydrochloric acid. This seems to increase the solubility and the rapidity of absorption. In the ordinary routine the patient first takes 1 ounce of castor oil, this is followed in two hours by 10 grains of quinin in the above solution. This dose is repeated at two-hour intervals until 30 grains are taken.

The use of pituitary extract in obstetric practice is of much more recent date. In 1913 I published a paper reviewing the literature up to that date and there pointed out that Blair Bell, in 1909, was the first to employ in practice the results of experimental investigations carried out on the extract of the pituitary gland up to that time. Since then a

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great mass of literature has accumulated on the subject. It is universally recognized that it is a most valuable agent for accelerating the second stage of labor when delay is due to feeble uterine contraction. In most of the articles which have appeared the reader is warned against using it for the induction of labor or before the cervix is fully dilated. We have used it extensively for the induction of labor and during all stages of labor, and have never had any bad results. In 1913 I recorded three cases in which I had successfully induced labor by its means. One of those was at the eighth month, one at full term and one at three weeks postterm. I stated then that the method was worth an extended trial, and I think that my further results bear this out. The method used is to begin with a dose of ½ to 1 cc., administered intramuscularly with a long needle. In most cases uterine contractions commence in about ten minutes and increase in severity during the next twenty minutes. At the end of this time the second injection of ½ cc. is given. If after a time the contractions tend to weaken or to come at longer intervals the dose is repeated. As many as six to eight doses may thus be given at intervals of about one-half hour. The important point is to administer a further dose before the effects of the previous one have entirely passed off. The effects from a single dose appear only to last for about one-half hour, and there is no cumulative effect. Sufficient doses must therefore be given to keep up uterine contractions sufficient to produce a certain amount of opening up of the cervix. When the cervix has begun to open and the membranes to bulge into it the uterine contractions will continue without the further administration of the drug. The failures which we had in the beginning were the result of not pushing the dosage far enough. We have found it perfectly safe to give 8 to 10½ cc. doses at half-hour intervals.

We at one time thought it would be unsafe to use the method for inducing labor in pregnancy toxemia with raised blood-pressure. Dr. W. W. Lailey, one of my colleagues in my department, carried out a series of observations on the effect of pituitary extract on the blood-pressure during preg-

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nancy and labor. He found that a single dose only raised the blood-pressure about five points and that its effect was quite temporary; subsequent doses did not tend to raise it above this level. We have therefore had no hesitation in using it in pregnancy toxemia when the induction of labor seemed desirable. During the last few months we have given it in cases of actual eclampsia, to whom we were also administering morphin, according to the Stroganoff method.

In carrying out this method of induction it is necessary to have the patient in hospital or in charge of a very competent nurse at home. It is often difficult to get the patient to enter the hospital before labor has actually begun. In private practice we frequently instruct the patient to take quinin according to the above method at home, and if labor does not commence within four hours of the taking of the last dose, to have her come into hospital and begin the administration of pituitary extract. In many of our cases this combination has been used.

In the appended tables the figures are given showing the average time which has elapsed before labor has begun after the use of the various methods. It will be seen that with bougies an average of twenty hours elapsed between the introduction of the bougie and the definite onset of labor, and the average duration of labor was eighteen hours.

Rather a curious point comes out here, that in 19 multiparæ the average was nineteen hours as contrasted with eighteen hours as an average in 18 primiparæ.

Induction of Labor with Bougies

	No.	Beginning of labor.	Duration of labor.
Total cases	37	20 hours	18½ hours
Primiparæ	18	28 "	18 "
Multiparæ	19	14 "	19 "

Induction of Labor with Pituitary Extract

	No.	Beginning of labor.	Duration of labor.
Total cases	18	2 hours	10 hours
Primiparæ	5	1¼ "	16 "
Multiparæ	13	1½ "	9 "

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Induction of Labor with Quinin

	No.	Beginning of labor (after last dose).	Duration of labor.
Total cases	25	7 hours	9 hours
Primiparæ	11	8 "	11 "
Multiparæ	14	6 "	7 "

Induction of Labor with Quinin and Pituitary Extract—53 Successful Cases Out of Total of 62

	No.	Labor began after first dose in	Duration of labor.
Total cases	53	2 hours	10 hours
Primiparæ	23	3 "	14 "
Multiparæ	30	1 "	7 "

Induction of Labor with Bags.

	No.	Beginning of labor.	Duration. of labor
Total cases	8	13 hours	10 hours
Primiparæ	4	8 "	11 "
Multiparæ	4	26 "	9 "

(One multipara with dead fetus took forty-eight hours to start labor.)

With the bag method the average time elapsing before labor began was thirteen hours and the average duration of labor was ten hours. This number, of course, is very small and not sufficient to draw conclusions from.

With quinin alone in 25 cases the average time elapsing from the last dose to the definite onset of labor was seven hours, while the average duration of labor was nine hours—seven for multiparæ and eleven for primiparæ.

With pituitary alone in a total of 18 cases the average time elapsing between the first dose and the definite onset of labor was two hours. The average duration of labor was ten hours, sixteen hours for 5 primiparæ and nine hours for 13 multiparæ.

With quinin and pituitary extract, in a total of 62 cases 53 were successful and 9 were totally unsuccessful; 6 of the successful cases required repetition of the routine before labor

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began. In the 53 successful cases the average time elapsing between the first dose of pituitrin and the onset of labor was two hours and the average duration of labor ten hours; fourteen hours for 23 primiparæ and seven hours for 30 multiparæ.

The labors in the quinin and pituitrin cases were spontaneous except in 4 cases in whom forceps were used when the head was on the perineum. In the total of 53 there were 4 stillborn babies. In one it had been noted that the movements were very feeble before the administration was begun. In one the cord was so tight around the neck as to make a distinct groove, and evidently the circulation in the cord had been stopped. In another the cord was around the arm, producing a marked constriction and stoppage of the circulation through the cord. In the fourth no cause could be assigned for the stillbirth. Excessive fetal movements have never been noticed in any of the cases, so that I do not think that the constriction of the cord in the above 2 cases was the result of the drugs administered.

Recently two of my colleagues, members on my staff, J. G. Gallie and W. A. Scott, have recorded a series of 65 cases in which they used pituitary extract alone for the induction of labor. Out of this total 55 were entirely successful. The average number of doses given was three, the average duration of labor was seven hours. There was one fetal death twenty-eight hours after delivery from atelectasis. The delivery was normal in forty-five cases, by forceps in nine and by version in one case.

Taking these results along with the ones which I have recorded, I think we must recognize that the method has a definite place in obstetric practice and should be considered before other methods are adopted. It has very special advantages in cases of slight disparity between the head and pelvis, as it does not in any way prejudice the Cesarean operation should it prove to be necessary, an argument which cannot apply to the bougie or bag method.

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INDUCTION OF LABOR AT TERM

By Charles B. Reed, M.D.
Chicago, Ill.
(By Invitation)

From the time of van Deventer (1701) to the present our best obstetric thought has been devoted to the study of contracted pelves and the dangers and difficulties which these anomalies develop in the course of pregnancy and labor. This work has been pursued with a most engrossing interest, and it has resulted in additions and in technical accessions to our knowledge of wide and far-reaching importance so essential and vital indeed as to constitute the very foundation of our obstetric science.

Meanwhile but little attention, comparatively, has been paid to the corresponding term of the problem which involves the large, the mature and the postmature child. It is evident that the large child, whether mature or postmature, must be just as definite and just as serious a complication of labor as the generally contracted pelvis with which it competes for an evil preëminence.

In spite of the narrower interest, however, this aspect of the subject has been approached from various angles, and one man after another has examined and established with workable accuracy several parts of the large child problem. The results of these investigations have much practical utility, and some of them may now be assembled for specific application.

The duration of pregnancy is a weighty factor which has been thoroughly investigated by Ahlfeld, Casalis, Issmer, von Winckel and others. Their work leads them to conclude that the average period for human gestation should be set at from

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270 to 280 days, with an allowance above and below these figures of about thirty days, to provide for the uncertainty in the time of conception and the accidental element in the onset of labor. They generally conclude that 275 days is as near as they can estimate the actual time that elapses between the fertilization of the egg and the maturity of the child. This period is remarkably exact if we consider for a moment our utter ignorance of date of fertilization as well as of the phenomena that lead to the onset of labor. This latter condition is generally and quite conveniently recognized by the word "term," which is somewhat approximate but wholly non-committal.

It is a matter of common knowledge that the pregnancy may be either abbreviated or prolonged beyond the time set. The prolongation of pregnancy is the less frequent. This phase of the question has been worked out by Parvin, who found that from 6 per cent. to 8 per cent. of all pregnancies go longer than the time usually set and accepted.

Von Winckel again has examined the effect of this delay in the onset of labor upon the fetus *in utero* and concluded that the phenomenon is regularly associated with large babies. His investigations led him to the broader conclusion that of all babies weighing more than 8½ pounds, 71.8 per cent. were postmature. In other words, whatever the period of gestation, at all events the time of fetal maturity has been overstepped.

It is evident that neither the menstrual history nor the known date of coitus does, or can, give us more than an approximation to the date of labor. Some other basis for our calculation must be obtained to discover the duration of pregnancy or at least the proper time for the onset of labor. It is more logical, and certainly more promising, to determine when labor is normally due, not by the days or weeks spent by the egg in the uterus but by the effect of that incubation on the fetus. The purpose of pregnancy is the production of fetal maturity. When the child is mature the normal end of intrauterine life has been accomplished.

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Before going further we must try to settle the question as to what constitutes maturity. This is of great importance, since if we can establish the conditions of maturity and the means of recognizing them *in utero* it will be possible to say at a given time that the mission of gestation has been fulfilled.

Theoretically the child should be mature when the embryonic type of cell has been transformed into the mature type, but this is not so. Ballentyne, with good reason and practicality, bases the attainment of maturity on the physiologic perfection of the organs. He makes the point that as soon as the organs are prepared to functionate satisfactorily in an extrauterine environment the fetus is mature.

This anatomic and physiologic perfection must needs be secured by residence for a variable period in the uterus whereby the child achieves a constant and rapid growth not only of the organs but also of structure and connective tissue. This growth and development persists until not only the organs but certain more or less stable general characteristics have been formed and fixed.

The fetus now presents that physical appearance of wholesome sturdiness which is so quickly recognized as maturity by the expert but is so difficult to describe. The child shows also a definite capability for an extrauterine existence, and we may therefore tentatively accept Ballentyne's definition of maturity as that state or degree of fetal development which enables a child to surmount the perils and aggressions of extrauterine life easily.

In particular, however, the child has acquired some rather definite landmarks which are authoritatively recognized as the gross evidences and criteria of maturity. The most important of these landmarks are the length and size of the fetus and the fetal head diameters. On these phases of the problem much time and thought have been expended. The writer has given the results of this work in considerable detail elsewhere, but for the sake of completeness it is advisable to reproduce a summary. The length logically should be regarded as the most important sign of fetal maturity. A

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standard of length has been accepted also quite generally. Ballentyne, Hirst, Hecker, Webster, Edgar, Dorland, Cragin, Eden, Peterson, Ahlfeld, Stumpf, Williams and Issmer agree that the length of a mature child should be 50 cm. to 51 cm. All admit the possibility of 48 cm. and extend the upper limit to 54 cm. Our own series gave measurements varying from 48 cm. to 53 cm., with an average of 50.2 cm. All the babes were mature according to the definition. Babes of less than 48 cm. are not mature, ordinarily, except in the case of twins; and babes cannot exceed 53 cm. in length without, in our opinion, entering the postmature class.

The size is next in importance. Without tiring you by the repetition of overly familiar figures, let us recall briefly that Hirst, Dorland, Edgar, Webster, Eden, Goenner, Cragin, Jewett, Stumpf, Williams, Ahlfeld and McDonald place the weight of a mature child at from 6 to 7½ pounds, with a low limit of 5½ pounds and no mention of an upper boundary. By implication only do we learn from this silence that babes that have long been mature must of necessity be postmature. The designation postmature is not common in the literature.

The diameter of the fetal head is the next point that concerns us. Von Winckel states that the average occipitofrontal diameter in maturity is 12 cm. and the biparietal 9.25 cm. Our own series gave the occipitofrontal in mature babes as ranging from 10 cm. to 12 cm. and the biparietal from 8.5 cm. to 10 cm. It is our opinion that all babes that possess the above-described characteristics of length, weight and head diameters within the limits set are mature, and that those who register below or above these boundaries are, ordinarily, immature or postmature respectively.

With these various conclusions in mind it is now possible to complete our definition and assert that maturity is that state or degree of development wherein the fetus is enabled to surmount the perils and aggressions of extrauterine life easily, and that such development is associated with a fetal length of from 48 cm. to 53 cm., a weight varying from 5½ to possibly 9 pounds, and heads that measure from 10 cm. to

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12 cm. in the occipitofrontal and from 8.5 cm. to 10 cm. in the biparietal diameters.

By this definition if we use the word "term" at all, we should use it to signify that the fetus has attained physical maturity instead of to indicate that the uncertain end of an indefinite time is approximately due. Moreover, it does not seem superfluous to reiterate that when the fetus falls within the scope of this definition the end of profitable intrauterine life has been accomplished and a continuance thereof can only be an indifference, if not an invocation, to all those dangers, morbidities and mortalities which are so familiar to us in cases of contracted pelvis or of the overlarge child.

It is not a catastrophe, ordinarily, for labor to occur a couple of weeks before the maturity of the child, as we have defined it, but there is a steadily increasing danger to the mother and child for every additional week of postmaturity. The child continues to develop at the rate of from 0.5 cm. to 1 cm. in length and one-half pound in weight each week, and this increase in size unnecessarily intensifies the obstetric problem, and by raising the chances of serious operative complications adds materially to the peril. The intrauterine child goes to maturity just as, later, the delivered babe ripens into an adult. In both cases in which maturity is attained, if the nutritional intake exceeds the expenditure the tissues will store up fat and become infiltrated with fluid. The abundance of this fat is not a sign of maturity but of postmaturity. These accessions of fat, moreover, are as worthless to the babe as to the adult. An excess of fat and fluid in the tissues of the babe hampers rather than facilitates organic action, and, furthermore, both the fat and the fluid are lost rapidly after birth. As we have shown elsewhere, babes that average 7 pounds lose 8½ ounces in two and one-half days and then begin to gain, while babes that average 9 1-10 pounds lose 14½ ounces before the gain begins. The increase in bulk, therefore, has served merely to complicate labor without any corresponding advantage to the child.

A consideration of the data thus reviewed has led us to

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believe that it is timely and desirable to apply to all cases of fetal maturity the principles of management that we sometimes employ in contractions of the pelvis. In other words, when the child becomes demonstrably mature, labor should be induced at the first convenient opportunity. In pelvic contraction, to be sure, the anomaly becomes apparent as soon as the appropriate tests are applied, while the presence of a mature child has not been commonly regarded hitherto as even a potential peril. Nevertheless, we induce labor, if we are wise, in contractions of the pelvis before the crisis appears even when the child is submature, so why hesitate to avert a similar complication when maturity is present?

The diagnosis of contractions of the pelvis, after two centuries of education, has become a more or less successful routine, but the diagnosis of fetal maturity, which is far easier, is not so common. The methods for determining maturity have been before the profession for some years, but as yet have not received the stamp of approval and of current usage. The details are readily available in the literature, but it is necessary to report briefly our own experience with them.

The length is ascertained by Ahlfeld's maneuver. In our series the postpartum figures tallied exactly with the antepartum estimate in 37 per cent. The variation was less than 0.5 cm. in 24 per cent. and less than 1.5 cm. in 29 per cent.

The weight and size of the child are estimated by the method brought out by McDonald some ten years ago. He assumes that when the uterus contains a mature fetus weighing 7⅛ pounds (3300 gm.) the fundus will be 35 cm. above the symphysis. He also estimates that the weight of the child will be increased or diminished by 200 gm. for each variation of 1 cm. in the height of the fundus. So far as concerns the determination of maturity we found this method to be practical and safe, but the estimates of weight were not so reliable, although they did not pass the limits of security.

The problem of the fetal head diameters was one of absorbing interest. Only two are possible—the occipitofrontal and the biparietal—but fortunately these are the ones most needed.

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By Perret's maneuver the occipitofrontal is measured directly as it lies more or less transversely across the inlet without making any allowance for the thickness of the abdominal walls. From this result the biparietal is estimated by a system of deductions according to a scale suggested by Perret and elaborated by McDonald. Thus if the occipitofrontal measures 12 cm., 2.5 cm. is deducted to get the biparietal. From 11.5 occipitofrontal 2.25 cm. is deducted. From 11.25 we take 2 cm. and from 10 to 11 we take 1.5 cm.

In our series the postpartum measurement of the occipitofrontal tallied exactly with the antepartum estimate in 40 per cent. The variation was 0.25 cm. or less in 34 per cent., within 0.5 cm. in 24 per cent. and erred by 1 cm. in 4 per cent. of the cases.

The biparietals obtained from the above occipitofrontals were found postpartum to be exact in 36 per cent., within 0.25 cm. in 31.7 per cent., within 0.5 cm. in 24 per cent. and to vary by 1 cm. in 6.5 per cent.

It is obvious that these differences are too slight to affect the diagnosis appreciably. All the babes but one were mature. Our sole failure was due to the stupidity of an intern. No system or technic can be entirely safe against error. These maneuvers are quickly learned, their application is easy and the results have been surprisingly accurate.

With the determination of the length and size of the child, and the two important diameters of the head, it seems to the writer that maturity is safely assured. The problem of the pelvis is admittedly a matter of technic and the only remaining question is the induction of labor. Whether or not the maturity of the child be generally accepted as a satisfactory and legitimate basis for bringing on the labor, at all events our ability to produce the delivery at will is an important addition to our obstetric armamentarium.

TECHNIC. The labor can be inaugurated by quinin and pituitrin, by castor oil and quinin, by the modified de Ribes bag, or by both. The castor oil acts in about two cases out of five, and most reliably when the patient is a little bit past

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the calculated date. The Vorhees bag, in our experience, is the most dependable, and is therefore the favorite agent at our hospital.

The patient's bowels should receive attention the night before, and in the morning the external genitalia is given a careful obstetric preparation.

Assemble and sterilize by boiling for twenty minutes a modified de Ribes bag No. 4 (Vorhees), a Simon speculum or vaginal retractor, a pair of long Pean forceps (dressing forceps will serve), 2 pairs of volsellum forceps, 2 pairs of compression forceps, a Goodell dilator, 1 tenaculum forceps, a hand-bulb syringe, with glass tubes and rubber connections for the bag, or a large piston syringe. The bag and accessory apparatus must be tested for defects before using.

The patient, prepared as for delivery, is placed upon the table in an exaggerated lithotomy position, with legs held by assistants or by stirrups. The vagina is retracted, a smear made from the cervix and the mucous membrane wiped clean with pledgets. Anesthesia is only occasionally necessary even in primiparæ.

One lip of the cervix is seized by the volsellum and brought down. If the bag has been properly prepared the os will admit it ordinarily without dilatation.

The bag must be emptied of residual air and the flat end pulled out. It is next rolled into a compact mass like a cigarette and seized by the Pean forceps, so that the tips extend just to the largest diameter of the rolled bag. After anointing the bag with sterile glycerin the bag is passed into the cervix with the concavity of the forceps turned toward the patient's left leg, and as it enters the os the concavity is turned upward one-quarter of a circle, so that when the maneuver is completed the curve of the instrument conforms to the flexure of the uterus. Release the lock of the introducing forceps, connect the tube of the bag with the filling apparatus and force the sterile solution (lysol, boric acid or plain water) slowly into the bag. Do not overfill by force or the bag will break. Tension in the tube of the bag or the feeling

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of resistance to the injection are signs of fulness to the experienced operator. If uncertain of the technic a measured amount of fluid may be used. A piston syringe of tested size will also serve to inform the operator when the capacity of the bag (six ounces) has been reached. The Pean forceps are removed as soon as the bag is sufficiently filled to keep it from slipping out. Snap the compression forceps on the tube. Remove the volsellum from the cervix and disconnect the syringe. Tie the tube of the bag strongly with tape. Remove the compression forceps. Place two sterile pads on the vulva, one on either side of the tube. Remove the stirrups and pull the patient up in the bed. The bag may break from overfilling, or being insufficiently filled may slip out of the cervix before the uterine contractions begin. If so, another bag should be inserted.

If the pains do not start within an hour a weight of one or two pounds is attached by a tape to the protruding tube and passed over the foot of the bed. Usually in from five minutes to half an hour the contractions begin and the labor is under way.

In a variable period, rarely more than four hours (three hours and twenty minutes in our series), the bag is expelled by strong pains, the dilatation is practically complete and the head follows the bag down into the pelvis, the membranes rupture and the second stage begins. From now on the case is managed according to general obstetric principles. The tedious, exhausting and painful first stage has been definitely shortened. The bag acts as a mechanical aid to cervical dilatation, a dynamic stimulant to the contractions, and it preserves the membranes from injurious pressure until physiologic rupture occurs.

When the membranes have been accidentally ruptured by the insertion of the bag no attempt should be made to pull on it to mark advancement lest it come out and by suction bring down the cord. When the bag comes out after accidental rupture of the membranes at the time of insertion it is good practice to make an internal examination, to discover the presence or absence of a prolapsed cord.

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In the series of 200 cases hitherto reported we had M-paræ 114 and P-paræ 86. The average duration of labor was seven hours and fifty-six minutes. The longest labor was thirty hours, and was due to a tough, inelastic cervix. Two others were in labor twenty-eight hours from cervical conditions. In one the cervix was a mass of cicatricial tissue. The shortest labor in an M-paræ was fifty-five minutes and in a P-paræ sixty minutes. The bag broke while being filled or shortly after insertion nine times. Another bag was introduced four times. The membranes were ruptured by the insertion of the bag seven times—in one case intentionally for hydramnios. The bag was expelled in an average period of three hours and twenty minutes. The longest detention was nine hours. The shortest was ten minutes. Two mothers died. One had myocarditis associated with a marginal placenta prævia. Her labor lasted only one hour and a half, and was accompanied by a normal amount of hemorrhage only. Death came two hours after the delivery. The other had a pneumonia and died eight days after labor.

In no case did the bag fail to inaugurate contractions nor the woman to deliver.

The average weight of the babes was 7.4 pounds. The smallest weighed five pounds and the largest ten pounds.

Twelve babies died:

1, child of P-paræ, born in asphyxia after sixteen and one-half hours of labor, was revived with difficulty and died three hours later.

1, child of M-paræ, born blue after a labor lasting one and one-half hours. Revived. Died suddenly thirty-six hours later.

2 died on second and fourth days respectively from hemophilia.

1 died of toxemia on the seventh day.

1, child of P-paræ, with small pelvis. The delivery was instrumental and the babe died two hours after birth.

1 died after forceps delivery, the occiput being posterior.

2 were stillborn. One died in the course of a rapidly

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progressing second stage half an hour after the heart tones had been strongly evident. The other, with heart tones diminishing, was delivered by forceps but could not be revived.

2 died from the compression of a prolapsed cord. One of these was luetic.

1 was premature, as previously explained, and the death was inexcusable.

OPERATIONS. Version and extraction were done four times for placenta previa, transverse presentation, prolapsed cord, and, to expedite labor, in a heart case.

Forceps were used thirty-nine times: Occipitoposterior position, 11 times; deep, transverse arrest, 15 times; insufficiency of the powers, 4 times; to hasten labor, 5 times; for instruction, 4 times.

There were two cases of prolapsed cord.

Our employment of the forceps may seem excessive to those who are guided by the statistics from large clinics wherein the women delivered are mostly normal and of strong physique. It does not seem improbable, however, that those of our colleagues who have much to do with our overcivilized American women will find in his private practice a larger percentage of forceps cases than in his clinical work.

Three of our cases developed temperatures; one was due to pneumonia, one to tuberculosis and one to mastitis.

No dilatation previous to the introduction of the bag was required in any case. In only five cases was chloroform employed for bag insertion, and then more on account of nervousness than for pain.

To these cases I now add twenty-four others which gave the following results:

Multiparæ, 15. Primiparæ, 9. Average detention of bag *in utero,* four hours and 1 minute. Average duration of labor, six hours and eleven minutes (1 history imperfect); 22 babes (two histories imperfect) averaged seven pounds and one ounce.

Operations: Low forceps, 8 (for deep transverse arr., 4;

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prolapsed cord, 1; heart case, 1; inertia, 2). Version and extension, 1 (prolapsed arm). Pubiotomy, 1 (aftercoming head delayed). There were no maternal deaths. One babe died from a prolapsed cord. Pains began in all cases in less than an hour.

It is a pleasure to report also 34 cases supplied by Dr. C. E. Boys, of Kalamazoo. Thirty of these were inductions at term. Average detention of bag *in utero,* five and one-third hours. Average duration of labor, eleven hours and fifteen minutes. Pains began promptly in all but one case, where they failed entirely.

Operations. Forcepts, 10. Version and extension, 1. Largest babe, 9½ pounds. Smallest babe, 5⅝ pounds. Prolapsed cord, 2. Maternal mortality, 0. Babies' mortality, 3. From prolapsed cord, 2. From forceps injury, 1. In 7 cases the temperature ranged from 100° to 101° F. on the third day. All were operative cases, in which the temperature could be traced to other origins than the induction.

It is also my privilege to report 270 cases of induction from the service of Drs. George Clark Mosher and Buford G. Hamilton, of Kansas City, Mo.; 190 of these cases were for labor at term and 80 for toxemia or moderately contracted pelvis.

In 24 cases the bag was used to replace prematurely ruptured membranes. In all cases castor oil and quinin preceded the bag by fourteen hours or more, but in only 18 cases was the bag rendered unnecessary. The average detention of the bag *in utero* was six hours and twenty-five minutes. The average duration of labor was multiparæ, eight and one-half hours. Ip. twelve hours. The shortest labor was one and one-quarter hours (multipara). The longest was sixty hours and required a second bag. Six cases failed to deliver after the bag was expelled.

Babies' mortality, 3.8 per cent., which is well within the average. Maternal mortality 5, due to nephritis, endocarditis and other complications independent of the induction.

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Prolapsed cord, 3. One apparently followed the descent of the bag.

Operations. Total for all cases about 35 per cent. (forceps or versions). Mosher states that this is about the average in their general work where the condition of the fetal heart tones is the especial guide for interference on the part of the babe.

All cases were checked by routine measurements before and after the delivery. There were no premature infants in this service. There were no infections, no appreciable displacements of the presenting part and no hemorrhages chargeable to the bag.

Certain objections have been urged against the use of the bag for the induction of labor. The most persistent of these is the danger of infection. In the early cases this fear was constantly before us and cultures and smears were made from the cervix in every instance. Streptococci, staphylococci, gonococci and the Bacillus coli were found, but the induction went on and we had no postpartum infections. This result was quite puzzling until it occurred to us that the comparative shortness of the labors might be a factor in conserving the patient's immunity. It is our belief that prolonged labors, though non-operative, are more disintegrating to the morale and more disastrous physically than extremely painful deliveries that are soon terminated. This opinion might be stretched enough possibly to cover the operative deliveries in which the trauma is not excessive. Lynch, Mosher, Boys and others who have used the bag extensively fully agree with the writer that the danger of infection may be disregarded if a good technic is possible.

It has been charged also that the introduction of the bag may disturb the presenting part and cause malpositions. This menace which always hung over us in the earlier days when the Carl Braun bag was commonly employed, and even later with the huge de Ribes affair, does not seem to be much in evidence at present when the small flat-topped fabric bag is used. A further insurance against the accident inheres in the

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self-control of the operator who contents himself with leaving the bag in the cervix, where it belongs, in place of trying to carry it to the fundus. So while admitting its possible or occasional occurrence, as Brodhead has also noted, yet we must regard the dislocation of the presenting part as extraordinarily rare. Moreover if the head should be lifted by the introduction of the bag it would soon resume its original position when the bag descended. In our second series we kept careful records of the positions and could not find an appreciable variation from the usual averages.

Whether a disturbance of the head favors a prolapse of the cord is still uncertain. Lynch maintains that a long cord is prerequisite to prolapse. If it happened, therefore, that a long cord should coexist with a disturbance of the presenting vertex, we must assume that the mechanical conditions are present which would permit a prolapse of the cord.

It has been charged further that the bag is unreliable and that in many instances the pains cease after the bag is expelled and the induction fails. Although we have not had this experience in our cases, Lynch reports 8 cases, Mosher 6 and Boys 1 case. We must accept this, therefore, as an infrequent but possible event in the hands of unimpeachable technicians. However, the bag is an unintelligent instrument, and it cannot be left to its own devices if good results are secured. It may break or come out; it may leak or fail to advance, and so the bag should be watched assiduously from the moment of its insertion. Occasionally it may be desirable to swing the bag to one side or release it from the weight to enable it to shift its points of pressure. When the pains are slow in starting it sometimes happens that a gentle massage of the uterus, for a half hour or so, will aid in bringing on or strengthening the contractions. The most common cause of failure is found in the cases in which the operator has introduced the bag and then has left the case with no one at all or only an inexperienced technician in charge.

"Meddlesome midwifry" is an alliterative imputation that

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is loosely and almost instinctively made against the induction of labor by those who wear congenially the trammels of tradition. Wright, of Toronto, answers this charge quite clearly. "If," says he, "we can perform the operation in such a way that it causes no danger, or at least very much less danger to the patient than the prolongation of the pregnancy involves, then we must conclude that such interference is not only justifiable but advisable."

In our own experience at Wesley Memorial Hospital it has seemed at times as if the pains of an induced labor were not quite so strong as in cases not induced. Whether the average of weak pains is larger or smaller than in non-induced cases we cannot say. Drs. Lynch and Mosher have both noted a diminished uterine irritability and a lessened responsiveness to the bag in cases of toxemia. Nevertheless, Mosher insists that the bag is the most successful method of treating these cases. He also considers it a valuable aid in reducing infant mortality. It is generally accepted at present that the induction should be done in a properly equipped hospital, and it is presupposed that the operator is familiar with the ways of measuring the child *in utero*.

In conclusion, it seems to us that the modified de Ribes bag is a safe and efficient agent for the induction of labor, and when properly used is open to few objections.

Furthermore, our experience justifies us in stating that not only is no harm done, but, in our opinion, much possible danger is averted by inducing labor when the child is mature. By this judiciously timed procedure the contractions of labor may be inaugurated when the child is ripe but still small enough to pass the pelvic canal without extreme difficulty. The mother is spared from four to six hours of suffering as well as serious operative trauma, and she rises from her confinement quickly and with unimpaired vitality.

A minor feature, but one not altogether unimportant, is the knowledge that the gestation will terminate on a definite date. This is both a mental and a financial relief to the patient and a marked convenience to the doctor. Neither he

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nor the patient is taken unawares. There is no mad rush to the hospital, but with the same equanimity and confidence that attend any other non-accidental surgical affair the contractions are started in the morning, the labor advances smoothly and happily for mother and babe and terminates usually in the afternoon or evening.

Under such conditions of election it is easily possible for the physician and his skilled assistant to give the patient the time and attention which all labors require and relatively few receive.

Medical thought is tending ideally toward prophylaxis. We strive to foresee and prevent pathology rather than await its onset. This is prudent prolepsis.

We believe that by the simple and easily applied tests which we discussed in this paper that fetal maturity *in utero* may be diagnosed definitely and unmistakably. We believe that the induction of labor by the methods described is a safe and advantageous procedure. We believe that by combining these measures the uncertain arrival of a large or postmature child will become, as it should, an exceedingly rare occurrence, and that it will happen only as an inadvertence or from a system of temporizing which, not unjustly, would be looked upon with dismay in other branches of surgery.

DISCUSSION ON THE PAPERS OF DRS. BENJAMIN P. WATSON AND CHARLES B. REED

Dr. Ralph H. Pomeroy, Brooklyn, New York.—I cannot personally accept the general proposition that induction of labor slightly before, at or after maturity adds in any important way to the safety of the mother or child. I believe there is added a certain amount of danger to the mother, especially so in primiparæ, if induction is carried out by foreign bodies introduced into the uterus.

The second paper gave me no enlightenment as to a point from which to start discussion, owing to the fact that it made no

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distinction between the statistics in multiparæ and primiparæ. I have no more knowledge than the rest of you as to exactly why or where labor begins. I do know two factors that are necessary for the progress of labor after it has begun: (1) that the ovum must be detached or easily detachable in whole or in part; and (2) that the uterus must make intermittent contractions resulting in retraction to a diminishing capacity of consent. Unless the ovum is detached it cannot descend. If the massive uterine content cannot descend there develops with persistent labor some degree of spastic retraction of the uterus instead of progressive retraction of that organ. The idea that you can induce labor always by dilating the cervix I dropped many years ago when I was experimenting with dilating bags in the endeavor to shorten the first stage. I found by many experiments that forced dilatation of the cervix, notably in multiparæ, did not necessarily induce labor. For several years past I have been trying to manage all labors without using induction at all.

If we are logical and correct in our belief that there is real danger in making vaginal examinations in labor in the first stage; if we accept the proposition that rectal touch is of real value in cutting down the dangers of contact infection carried from the vulva up to the cervix or cervical glands; if we admit that vaginal examinations add something to the risk of infection, we must admit also that we should try to manage labors without putting a foreign body in the cervix that remains there and obstructs drainage and causes traumatism and contusion. One can induce labor in a healthy multipara, who has no real disproportion, with comparative safety and certainty by merely rupturing the membranes. If I must put a foreign body in the uterus, I prefer to use a bougie of some form, because it can be managed so as not to block drainage from the cervix.

I certainly hope that Dr. Watson has discovered a process by which we can safely and promptly induce labor without cervix contact in the few cases in which we wish to empty the uterus forthwith. But at the present time, if the call is for an empty uterus at once, I prefer to cut below if the child is nonviable and above if it is viable.

Dr. George W. Kosmak, New York City.—A great deal of very valuable material is presented in the two papers of Dr.

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Watson and Dr. Reed, and I personally do not feel like taking the pessimistic attitude of my predecessor on this subject. It seems to me, as we develop our experience, we are guided more or less in what we do for our patients by what experience has taught us. I have for a number of years carefully watched my patients with the idea that if they went on to what was accepted to be the normal end of their pregnancy, labor be induced. Nothing that has been said against this attitude has convinced me that I have been wrong. I feel like agreeing with Dr. Reed that it is a procedure we must always bear in mind, but apply it to our patients individually rather than as a routine procedure. I do not want to be understood as advocating the induction of labor at term as a routine, but every one of our patients should be watched, particularly primiparæ, and if we have had the opportunity of making repeated antepartum examinations, I think we can feel rather certain as to when the child is large enough. We must be guided more or less by experience. In my own experience it has never happened in any case I had under observation that a premature baby resulted from this method.

I do not feel I can quite agree with Dr. Reed in his statement of absolute measurements. It is not really so important whether a child measures 48 to 52 cm., or whether certain diameters of the head are this or that. It is more important to study the type of patients we are dealing with. Some women can deliver themselves without difficulty of babies weighing nine and a half or ten pounds. Remember, we are dealing here with normal pelves. Others have difficulty in delivering themselves of a six pound child. In each instance careful pelvic measurements have shown we were not dealing with any abnormality. I think it is the latter type of patient that must be carefully observed, and if we have conducted such observations we ought to be ready to interfere when we think the proper time is a hand.

Another condition relates to the induction of labor in cases of toxemia. We ought to base our attitude in these cases, not on the attempt to bring the child as near term as possible, but at such a period when a viable child can be secured. I think the attempt to carry a toxic woman through the last three or four weeks of pregnancy is a very great mistake, because the baby is not in a satisfactory condition during this period and damage results to the maternal organs that can never be corrected.

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I was much interested in what Dr. Watson said about the use of quinin in inducing labor, because I only recently read the reports of our colleagues in South America who live in malarial districts, and who state that the employment of large doses of quinin, for the treatment of malaria in pregnant women, has been without result insofar as the induction of labor is concerned. There must be some difference between the women of Canada and South America. Perhaps Dr. Franklin Martin, who has recently visited South America, can explain it.

I was also interested in Dr. Watson's remarks about the use of pituitrin. It seems to me that he employs very large doses for this purpose. I am sure the New York atmosphere would not permit with safety the employment, the continuous employment of doses of ½ c.c. as many times as he recommends.

In conclusion, I want to refer again to the valuable work which has been done, in the last few years, by Dr. Reed and others, in bringing to our attention the necessity of watching each individual case of pregnancy to determine as closely as we possibly can whether that particular fetus is going to be able to go through that particular birth canal, and we think the time is at hand not to hesitate to help that woman out of possible future difficulty by inducing labor by methods that have now been pretty thoroughly worked out and demonstrated as safe.

Dr. Hugo Ehrenfest, St. Louis, Missouri.—I would like to add a few words to what Dr. Kosmak has said in relation to the use of pituitrin. I suppose it is safe and necessary to continue the old teaching that pituitrin should not be used in any other stage of labor except the second or third or after the third. I am quite sure many of us have experimented with the use of pituitrin in all stages of labor. I have done it for years.

I would like to have Dr. Watson answer a few questions. In my experience considerable difficulty arises from the dosage question. Dr. Kosmak says that ½ c.c. is too large a dose. I use smaller doses. There again the difficulty in my experience is that every pituitrin preparation is different. I have for years limited myself to one preparation, because I feel I know what I am using. If we use a different preparation we have absolutely no idea what dosage we really use.

I would like to ask Dr. Watson whether his experience coincides with mine, that is, when a patient receives pituitrin for

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the purpose of starting labor I find there is a decided difference whether the patient, after the injection, remains lying on her back or whether she gets up and walks around. I have no doubt in my mind that when a patient is kept lying on the back the contractions continue much longer. Why, I do not know. I would like information from Dr. Watson on that point.

Regarding the blood-pressure which was mentioned by Dr. Watson, I should like to emphasize that this special effect of various preparations seems entirely dependent upon the amount of histamin it contains. Some preparations raise the blood-pressure very little, others very much.

With reference to the effectiveness of starting labor that way, we all probably realize the pronounced difference between prima gravida and multipara, and between labor starting before the time of the normal end and after that. There is no doubt that a multipara who has gone over time responds most promptly.

I would like to emphasize one point already made by Dr. Watson, that such a method of starting labor has great advantages over all mechanical methods, if one should be forced to resort to Cesarean section afterward.

I should like to call the attention of Dr. Watson to the new literature on the intravenous use as an oxytocic, of the bihyperchlorate of quinin.

Dr. J. Whitridge Williams, Baltimore.—Two things interested me very much in this discussion. The first is Dr. Watson's contribution concerning the effect of pituitrin, and I earnestly hope that the future will bear out his experience, for if it does so he will have added a great boon to workers in obstetrics.

The other thing which interested me very much was what Dr. Reed has said concerning the induction of abortion in post-mature children. In my own work, I have recognized practically only two main indications for the induction of labor: First, in women suffering from the toxemias of pregnancy which do not yield to prophylactic treatment. In such cases we interfere primarily in the interests of the mother, and only secondarily for the sake of the child. The other indication is found in patients who have reached term, and in whom the child promises to exceed the normal limits. On the other hand, I have never been a friend of the induction of premature labor in contracted

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pelves, and in my whole experience have only employed it on several occasions.

During the past week I have had an experience which pretty well exemplifies my practice, For example, I did a Cesarean section at an appointed time before the onset of labor upon a woman with a normal pelvis, solely on account of the size of the child. The sequel showed that my diagnosis was correct, as the child weighed 4300 grams and had a biparietal diameter of 11cm. In other words, definite disproportion existed. At the same time there was a colored woman in the service with a generally contracted rachitic pelvis with a diagonal conjugate of 9 cm. She had a small child and no disproportion, was left alone and had a spontaneous labor.

At term I think that we should be extremely careful about inducing labor, and should not think of resorting to it unless we have a perfectly justifiable indication. To my mind such an indication does not consist in the mere fact that so many days have elapsed since the last menstrual period, or that the child has attained the average normal size; but we must demand that it has attained a size which threatens to give rise to disproportion and will certainly do so if allowed to become still larger. In other words, I see no reason why labor should be induced in a woman with a normal pelvis unless the child definitely exceeds the usual size, as to do so would simply lead to what I am afraid we are approaching in so many lines, namely, excessive operative interference. I am sorry to say that this tendency has already become established in regard to Cesarean section, and unless the indications for the induction of labor at term are carefully guarded, that operation will likewise be soon abused to a similar extent.

I do not wish to be misunderstood in this matter, however, as I regard with suspicion every woman who has reached the calculated date of confinement without falling into labor. In such cases it is my practice to palpate the patient each week, and as soon as it appears that the child threatens to exceed the normal size, labor should be induced. In general I have found the most satisfactory method of inducing labor, where haste is not essential, is by the use of a large Wales' bougie. I use one the size of my finger, and it is so satisfactory that I employ bags practically only in cases of placenta previa, which are not under discussion.

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DR. HAROLD C. BAILEY, New York City.—On our Bellevue service we have been committed to the idea of the induction of labor at term, but I cannot say that it has been a routine. Various factors have prevented this. The service is so busy from admissions that it is difficult to do a procedure like this regularly; but every week we go over the antepartum cases, and those who seem to be oversize or full term have their labors induced. We always start by a method somewhat similar to what Dr. Watson has outlined. We dilate the cervix to two fingers, and then give a dose of castor oil directly, and 10 grains of quinin some two hours afterward.

A great number of these women will fall into labor in the early morning hours. Since the first of the year, in addition to this, we have been adding 3-minim doses of pituitrrin, giving 4 doses one-half hour apart.

The records kept of patients at Bellevue have been of the dispensary class, and I can give the records only from my own notebook. It shows there were 35 cases in which the induction of labor was attempted by means of dilatation to two fingers, then the giving of castor oil and 10 grains of quinin. Of these 35 cases, 12 were primiparæ, and only 3, or 25 per cent., went into labor the first twenty-four hours. Of the remaining 23 multiparæ, 56 per cent. of them went into labor the first twenty-four hours. Taking the combined 35 cases, 45 per cent. went into labor without any further treatment. If the woman does not go into labor following this procedure we usually allow forty-eight hours to go by and then a No. 4 Voorhees' bag is inserted. We do not use a bag less than No. 4 except in placenta previa. If we talk from the standpoint of the treatment by bags, and if we take the records from the Manhattan service where induction of labor at term is not routine, we find, in going over 161 cases of induction, there are 60 cases of vertex presentations induced for rupture of the membranes, or dry first stage, or oversize of the fetus. Of these 60 cases, which might be termed more or less normal, there was a stillbirth rate of 3 cases, but 1 case was an anencephalic child. Disregarding the monstrosity, we have stillbirths at 3.3 per cent. and the mothers remained normal.

I will not go into the deaths in cases of toxemia, excepting to say the stillbirth rate went up tremendously in toxemic states.

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DR. RUDOLPH W. HOLMES, Chicago.—One of the mysteries of life will be unfolded when scientific knowledge tells us when pregnancy begins. Until that time comes, we always will be uncertain as to what full time or term means. The uncertainty of the onset of pregnancy carries with it a doubt as to maturity measured by days or weeks. There are large men, women and children, just as there are small ones. Children, for example, of ten or twelve years of age, may be overlarge or very diminutive for their years, yet at maturity are just ordinary individuals. Unborn babies vary as to size, yet are normal for the period of gestation considered. They may be large or small as the case may be, yet are normal. We all know that there is a material variation in size of children born from different mothers—size, *per se*, is a poor criterion of what we call maturity, or, for that matter, frequently of viability. I have had one woman who gave birth, on the day of reckoning, to a thirteen and a half pound baby. None would hold that child to be postmature. Some years ago I saw a woman who was about to have an induction because the fetus was over large, yet, at my insistence, she went on, and nearly three months later gave birth spontaneously to her baby. In this latter case an egregious miscalculation of the period of pregnancy was made, and such mistakes may be readily made. We have all seen babies born prematurely, by the accumulated evidence of all data, yet had the appearance and viability of full-term babies. On the other hand, we have that historic individual, whom I saw many years ago, who slept in her father's overshoe as a crib for a year or two. It surely could not have weighed much over a couple of ounces at birth, as it weighed only a couple of pounds when eighteen years of age. I have yet to be convinced of the postmature child, at least to the extent that is held by mothers and too many physicians.

With reference to the question of pituitrin, as far as my knowledge goes it is the most powerful drug known. It has been stated by an official of one of the large pharmaceutical houses that the fluid contained in the cubic centimeter ampule contains, as nearly as they may compute the dosage, one three to four millionth of a grain of the active secretory substance of the pituitary body. Such an active substance demands the most circumspect exhibition. The pituitary substances are used most promiscuously by the profession, and in a most haphazard manner. I have long felt that the fact that so few

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catastrophes have followed this indiscriminate use is dependent upon the fact that there is such a wide difference in the potency of the products of different manufacturers.

Dr. Young, of the Public Health Service, investigated the potency of various pituitary fluids and found that some were as low as one-eighth the effect of some others. Over a generation ago it was appreciated that the indiscriminate use of ergot, given in labor, was followed by most lamentable catastrophies. I believe we are arriving at the same realization of the dangers of pituitary substances. I am convinced that the exhibition of a full ampule of pituitary fluid, yes, even one-half ampule doses, repeated half hourly for six doses, as a means of inducing labor will sooner or later spell disaster, especially if employed by physicians who are unable to gauge its dangers.

Dr. N. Sproat Heaney, Chicago.—Since there are so many involved points in the discussion of the indications for the induction of labor, I shall confine my remarks entirely to the technic. The case that Dr. Holmes spoke of, where a patient went three and a half months after she was estimated to be at term, as well as the case of the Lilliputian baby mentioned, will illustrate what I mean when I say "involved." In reference to these particular cases, however, I would say that where such cases happen, the "specialist" had better go into eye, ear, nose and throat rather than into obstetrics.

At the Presbyterian Hospital we formerly used bags to induce labor almost to the exclusion of other methods, until we became convinced we were having more trouble with the bags than benefit gained by their use. Latterly we have used quinin and caster oil almost exclusively. At the time of examining the patient, to see whether labor should be induced or not, we separate the membranes widely from the cervix and then give castor oil and quinin. We always give small doses at intervals, since we find an occasional patient who has an idiosyncrasy to quinin. Even 3 grains will produce an annoying disturbance occasionally, in which event we may stop the quinin before we have poisoned our patient too extensively. In the event that the first administration of oil and quinin is not successful, we allow the patient to rest before repeating the dosage. During the last two years, following this method, I have resorted to the bag only three times in the induction of labor. During this

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period of two years we have had only one baby born dead. These were not only induced cases but cases also that went into labor spontaneously. The death in this case was caused from the separation of the placenta. In a second case of induced labor, where the placenta separated, we did a hasty forceps, and though the child was born alive it died soon after from forceps injury.

DR. BENJAMIN P. WATSON, Toronto, Ontario, Canada (closing the discussion on his part).—In regard to the dosage of pituitary extract, I myself was rather afraid of it when we first began to use it, but I must say that I am no longer afraid of it. The thing to remember is that the effect passes off very quickly. If there is any effect from one single dose, it passes off inside of twenty minutes or half an hour. As there is practically no cumulative effect of the drug, I do not see that it makes any difference how often you repeat it, provided you allow an interval of twenty minutes or half an hour. You must repeat the dose when the effects of the previous dose pass off. I have never seen any bad effects from the use of the drug given in that way.

There can be no question that there is a great difference in the different preparations of pituitary extract. A reliable preparation should be used.

I have not seen any difference in the action, whether the patient was allowed to walk about or kept in bed. We usually keep them in bed and do not allow them to walk about.

There is a difference, of course, in the results one gets with primiparæ and multiparæ. The results are less certain in the former. The time of pregnancy at which labor is induced has an effect. If the cervix is not taken up at all the induction is more difficult because labor does not begin until the cervix is sufficiently dilated and there is sufficient detachment of the membranes to produce a distinct bulging so that the ovum may descend.

As regards quinin, the method of administering it in acid solution is an important one. This was demonstrated in our use of quinin at Salonica. We took quinin sulphate in powder, 10 grains a day, without any discomfort. When taken in acid solution one got a buzzing in the ears, showing that the quinin was acting efficiently. I have given my patients quinin in this form for the induction of labor. In the same way intravenously

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you get a much more rapid action, but I have never attempted to give the drug intravenously in these induction cases.

DR. CHARLES B. REED, Chicago (closing the discussion).—There is little to add. It has been quite gratifying to note the kindliness with which the bag method of induction has been received, a kindliness which arises no doubt in large part from a polite self-restraint and is on that account the more appreciated.

I am glad that Dr. Holmes has reported in this connection his case of prematurity in which induction of labor was urged. It is in just such cases that we realize the necessity of making, as a routine, those extra-uterine measurements of the intra-uterine child which I have emphasized in my paper. I thank you.

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THE PROPHYLACTIC FORCEPS OPERATION

By Joseph B. De Lee, M.D.
Chicago, Ill.

The time is not yet ripe for a general recommendation of the procedure to be described in this paper, yet, as obstetric specialists, we must lead the way in improvements of our art —and this is still capable of improvement. The public is demanding, with a voice that becomes louder and more insistent each year, relief from the dangers of child-birth for the child-bearing woman. As regards the pain, the rapid spread of the twilight sleep craze will show the demand. That tokophobia is spreading among the women is a fact.

If we study our cases carefully the conclusion is inevitable that while we have decidedly improved the maternal mortality and morbidity, and have reduced the fetal deaths somewhat, labor is still a painful and terrifying experience, still retains much morbidity that leaves permanent invalidism. The latter statement is also applicable to the child. Many efforts are being made to ease the travail of the woman and to better the lot of the infant. What follows is another such effort. Experience alone can decide if it accomplishes its purpose.

The prophylactic forceps operation is the routine delivery of the child in head presentation when the head has come to rest on the pelvic floor and the early removal of the placenta. Primiparous labors, and those in which the condition of the soft parts approximates a first labor, are treated by this method, which really comprises more than the actual delivery of the child. It is a rounded technic for the conduct of the whole labor, with the defined purpose of relieving pain, supple-

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menting and anticipating the efforts of nature, reducing the hemorrhage and preventing and repairing the damage.

It is not a complete reversal of the watchful expectancy that is universally taught, but I cannot deny that it interferes much with Nature's process. Were not the results I have achieved so gratifying I myself would call it meddlesome midwifery.

A typical case is treated as follows: As soon as the pains are well established and the cervix opened 2 to 3 cm. the parturient is given 1/6 grain morphin and 1/200th scopolamin. After one hour 1/400 gr. scopolamin is given and in one or two hours occasionally a third dose of the same size. The room is darkened and suggestion used as much as possible to aid the medicines. This is really a modified twilight sleep and usually the cervix dilates and the head comes down on the perineum without the necessity of further drugs. Occasionally 15 gr. chloral and 40 gr. sodium bromide are given per rectum to aid the morphin at the end of the first stage, or gas and oxygen are administered by an expert. It is important to obtain complete *spontaneous* dilatation of the cervix, and the slower the better. The importance attached to this point, the natural dilatation of the cervix and the slow retraction of the pericervical connective tissues cannot be exaggerated. We are unable to imitate this by art.

When the head has passed the cervix and rests between the pillars of the levator ani, and has begun to part them and to stretch the fascia between them—a matter that is easily determined by rectal examinations—the patient is put to sleep with ether and a typical perineotomy (soon to be described) is performed. Under the minutest possible control of the fetal heart tones—either the operator listening frequently every minute, with the head stethoscope, or an assistant doing it—the forceps are applied and delivery accomplished. This is usually surprisingly easy. As soon as the child's head is born, 1 c.c. of Burroughs & Wellcome's pituglandol is injected into the deltoid muscle. A nurse stands ready with 1 c.c. of aseptic ergot, and this is injected into the outer thigh muscles

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as soon as the placenta is visible in the vulva. If there is hemorrhage the placenta is removed at once; if not, we wait five to ten minutes. The operator either changes his gloves or disinfects them with antiseptics and inserts the left hand into the lower uterine segment, palm up, while with the outside hand the hard (pituitrin) uterus is pushed down on the already descended placenta. The placenta slides down the hand like a heel slides along a shoehorn. We call this method of expression of placenta the "shoehorn maneuver," and it is the rare exception that the placental delivery needs more help than light pressure on the contracted uterus from above. Should there be any undue bleeding another ampoule of pituitrin is injected directly into the uterine muscle through the abdominal wall. Uterine tamponade is almost never needed.

The woman is now given ¼ gr. morphin and 1/200 gr. scopolamin to reduce the amount of ether required for the repair work, to prolong the narcosis for many hours postpartum and to abolish the memory of the labor as much as possible. If the pains are strong, perineotomy without forceps may suffice for the easy delivery.

It is surprising how bloodless the operative field, especially the cervix, has become. The cervix is pulled down with specially constructed ring forceps and all tears immediately repaired. I have thus gained a large experience in cervical tears and find it necessary to revise my previous notions of their anatomy. The cervix tears often in even spontaneous deliveries. The body of the cervix often tears, leaving the mucosa internal and external intact. Later such cervices show all the evidences of laceration, chronic inflammation, eversion, erosion, etc. Those lacerations which are open also show the separation of the muscle of the cervix at the sides, and the deep retracted portions of the wound must be pulled out and united, preferably with buried sutures. Our previous failures in cervical repair were, I believe, due to non-recognition of this fact.

THE PERINEOTOMY. This is one of the most important steps of the procedure—its making and repair. It is essential

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to have clear notions of the normal anatomy of the pelvic floor and how the structures are changed during delivery. The models are intended to show these things: The head advancing through the hiatus genitalis (1) stretches the vagina radially and longitudinally—it also, sometimes, wipes the vagina off its fascial anchorings, sliding it downward and outward. (2) The head stretches the pelvic fascia over the levator ani, and between the rectum and vagina and the layer behind the rectum, also radially and longitudinally, and this also permits the rectum to be wiped downward and slid off its fascial attachments to the levator ani. (3) The head often tears or overstretches the fascia over the levator ani, especially those bundles which hold the pillars of the muscle in position at the sides of the rectum, spanning the hiatus genitalis, and this permits the pillars to separate—a real diastasis of the levator pillars resulting, and the pathology is similar to that of the diastasis recti abdominales. This diastasis of the levator pillars and the wiping or sliding of the rectum and vagina downward and outward are the essential features of most pelvic-floor injuries, and have been, to my mind, the least noticed by current writers. (4) The tears in the levator ani muscle are usually due to improper treatment, and they occur, least commonly, near the insertion of the muscle on the pubic ramus (usually due to cutting by the forceps) and more commonly at the sides of the rectum, behind, near the raphé. (5) Labor always ruptures the urogenital septum, tearing it in all directions, and also from its ramifications with the endopelvic fascia, both above and below the levator ani. (6) The fascia between the vagina and bladder is also stretched or torn, also radially and in a downward direction, tearing the vagina and bladder off its anchoring to the upper surface of the endopelvic fascia over the levator ani and the posterior surface of the pubis.

It is thus evident that most of the damage resulting from labor is due to injury, rupture, distraction and displacement of the fascia and less to tearing of the muscles.

Prevention, therefore, aims to preserve the fascia in its

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normal position throughout the parturient canal, and when the overstretching or rupture cannot be avoided, to incise the structure at a spot where it can be repaired by suture.

We cannot do anything directly to save the pericervical connective tissues from radial and longitudinal overstretching and tears—we can, indirectly, by avoiding all interference with the natural processes of dilatation of the cervix and restraining the natural powers if they are too violent. This means the avoidance of bags to hasten the dilatation, of manual stretchings, of urging the parturient to bear down before the head has passed the cervical barrier and especially avoiding pituitrin before complete opening of the cervix.

We can take direct action to save the fascial and muscular structures of the pelvic floor, in addition to practising the measures just mentioned for preserving the connective tissues of the upper pelvis. By incising the fascia at its most vulnerable point, and reuniting it after delivery, we are almost always, not invariably, able to eliminate all damage to the pelvic floor. The first incision is through the skin and urogenital septum, exposing the pillar of the levator ani covered with the fascia endopelvina. Next the vagina is incised and with it the upper layer of the levator ani fascia exposing the rectum, which is seen at the bottom of the wound covered with its fascia propria. Next the fibers of the fascia communicating with the urogenital septum are cut, which allows the perineal body with the sphincter ani and rectum to fall to the side opposite the cut. Simple episiotomy will not prevent injuries to the pelvic fascia. When the disproportion between the head and the pelvic floor is great, the muscular belly of the levator ani is also incised at a right angle to the fibers' length. The models show these incisions better than descriptions.

Sometimes during the delivery the fascia tears and stretches more than we wish, but never so much that we lose the advantages of the preliminary incisions. By slow extraction we reduce this possibility very much. The repair is done with catgut, layer by layer, vagina, muscle, fascia, urogenital

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septum, subcutaneous fat and fascia and skin, all in anatomico-surgical fashion. Primary union is the rule and examination later shows that virginal conditions are usually restored.

Now, should virginal conditions be restored? Did not nature intend women should be dilated in the first labor so that subsequent children will come easily? Are not the lacerations normal?

Labor has been called and still is believed by many to be a normal function. It always strikes physicians as well as laymen as bizarre, to call labor an abnormal function, a disease, and yet it is a decidedly pathologic process. Everything, of course, depends on what we define as normal. If a woman falls on a pitchfork, and drives the handle through her perineum, we call that pathologic, abnormal, but if a large baby is driven through the pelvic floor we say that is natural and therefore normal. If a baby were to have its head caught in a door very lightly, but enough to cause cerebral hemorrhage, we would say that is decidedly pathologic, but when a baby's head is crushed against a tight pelvic floor, and a hemorrhage in the brain kills it, we call this normal, at least we say that the function is natural, not pathogenic.

In both cases, the cause of the damage—the fall on the pitchfork and the crushing of the door—is pathogenic—that is, disease-producing, and in the same sense labor is pathogenic —disease-producing, and anything pathogenic is pathologic or abnormal.

Now you will say that the function of labor is normal, that only those cases which result in disease may be called abnormal. Granted, but how many labor cases, measured by modern standards, may be so classified? Sir J. Y. Simpson, said that labor, in the intention of nature, should be normal, but that in a large proportion of cases it was not so. If the proportion was large in Simpson's days the middle of the last century it amounts to a majority today. In fact, only a small minority of women escape damage during labor, while 4 per cent. of the babies are killed and a large indeterminable number are more or less injured by the direct action of the

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natural process itself. So frequent are these bad effects that I have often wondered if nature did not deliberately intend women should be used up in the process of reproduction in a manner analogous to that of the salmon, which dies after spawning? Perhaps laceration, prolapse and all the evils soon to be mentioned are, in fact, natural to labor and therefore normal, in the same way as the death of the mother salmon and the death of the male bee in copulation are natural and normal. If you adopt this view I have no ground to stand on, but if you believe that a woman after delivery should be as healthy, as well, as anatomically perfect as she was before and that the child should be undamaged, then you will have to agree with me that labor is pathogenic because experience has proved such ideal results are excessively rare.

What are the factors that render labor so pathogenic? Dangers, immediate and remote, threaten both mother and child throughout.

First for the mother. Infection is always a threat, even under the most ideal conditions. Virulent streptococci inhabit a large percentage of vaginæ, and if the second stage becomes too prolonged, if the bruising of the parts is too extensive, if the woman's resistance is worn down by too much suffering or by hemorrhage, they may invade the organism and prove fatal. The death may occur in a fashion that hides the cause from the unobservant accoucheur, *e.g.*, a very mild sepsis or even a single rise in temperature is shown, and, in the second week, death occurs from embolism.

Exhaustion is not infrequent in a second stage that may not be too long for a healthy woman, but in one whose nerve reserve is low exhaustion may lead to immediate nervous shock, and, later, pronounced neurasthenia. If the twilight sleep propaganda taught us anything it showed us the actual value of preserving the nervous strength of the parturient.

Of greatest importance, because of greatest frequency, is the damage to the pelvic floor and perineum; next comes the injury to the vesicovaginal fascia and then the lacerations of the cervix and the connective-tissue supports of the uterus, the

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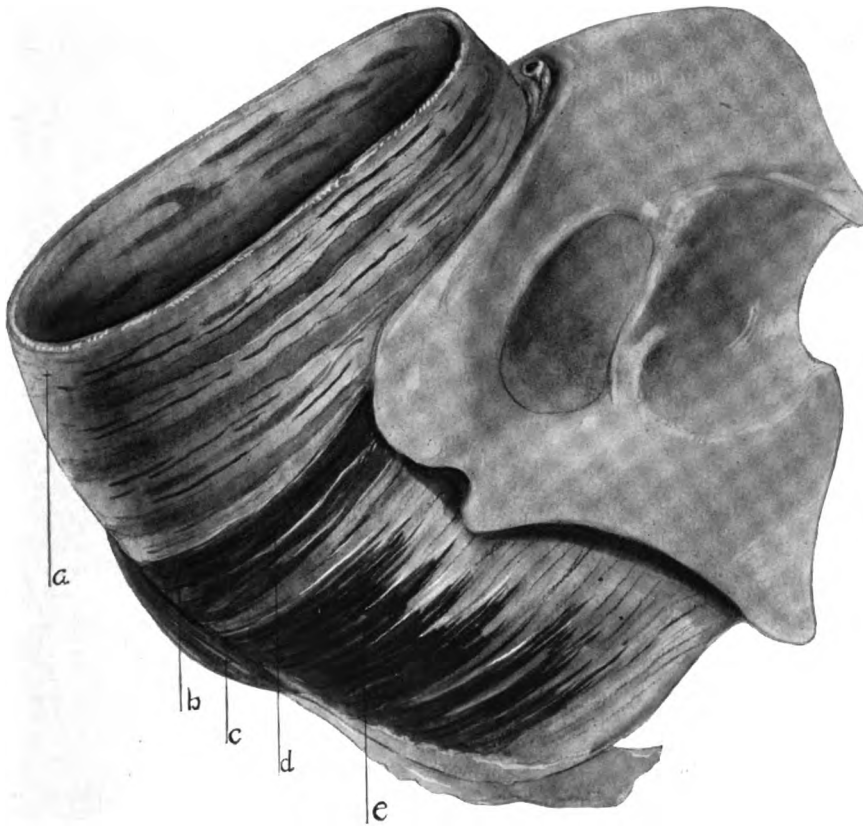

FIG. 1.—Partly diagrammatic to show the axial displacement, the distraction and rupture of the fascia and muscles during the passage of the fetal head. *a*, Urogenital septum much distracted; *b*, usual site of rupture of levator ani; *c*, sphincter ani; *d*, levator ani pubic portion or "the pillars;" *e*, levator ani ischio-coccygeal portion.

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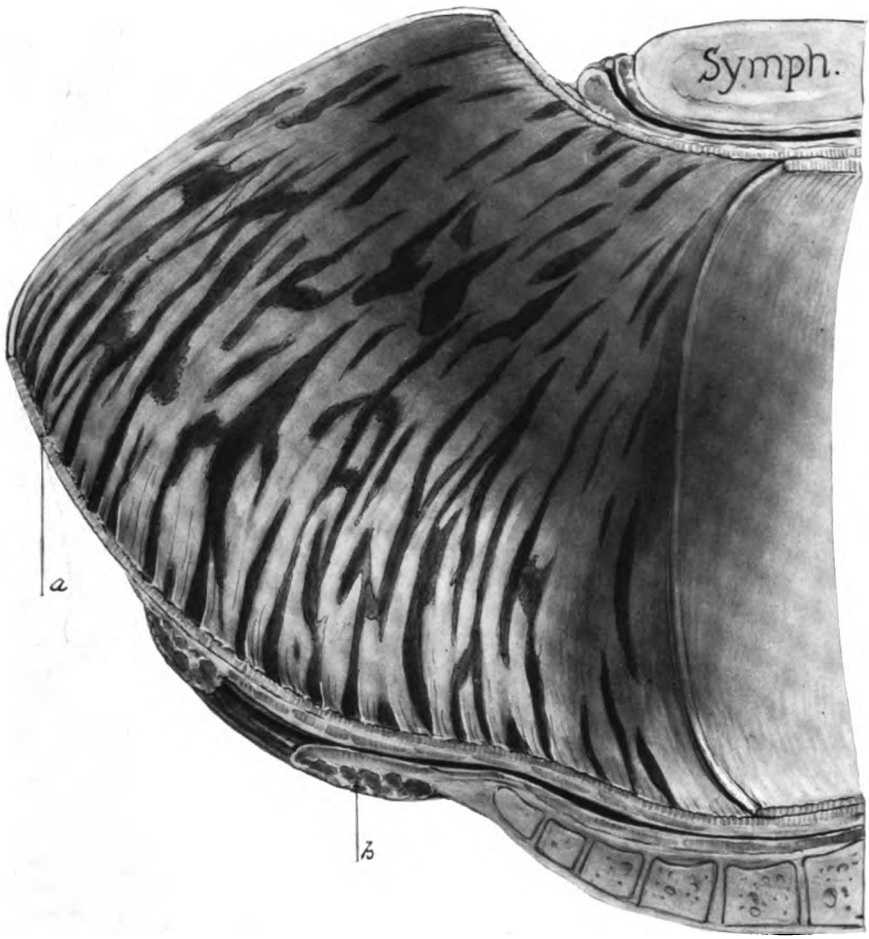

FIG. 2.—Purely diagrammatic, to show the interior layer of the ani fascia torn and distracted during the passage of the fetal head. *a*, Urogenital septum; *b*, sphincter ani.

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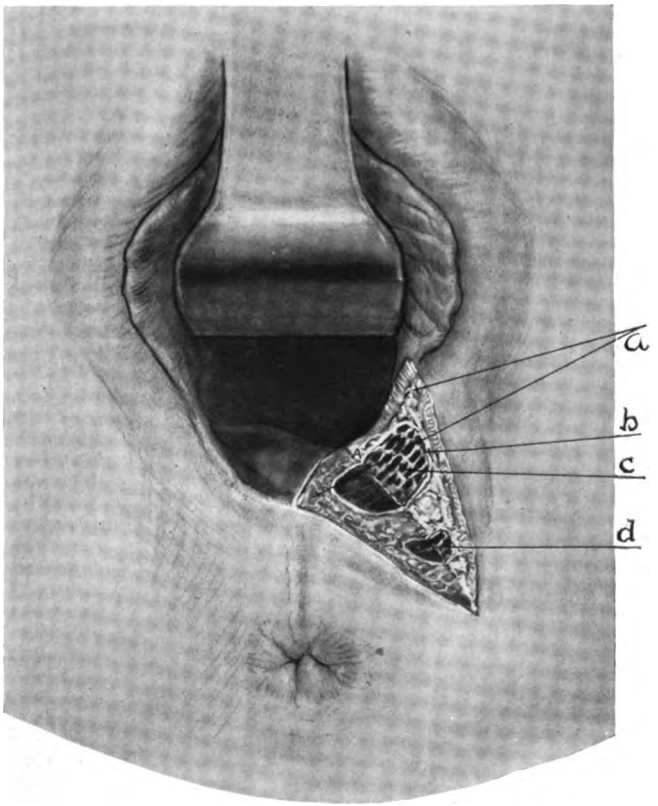

FIG. 3.—The perineotomy. Cut are the skin, the vagina, the urogenital septum, the outer layer of the levator ani fascia with its reflection over the deep transversus perinei muscle, the fascia over the levator ani both external and internal (the latter is called the fascia endopelvina). The portion of the fascia endopelvina between the levator ani pillars is called (by the author) the "intercolumnar fascia" and is shown at *A*. *a*, Urogenital septum; *b*, levator ani fascia; *c*, levator ani muscle or pillar; *d*, cut edge of deep transversus perinei muscle.

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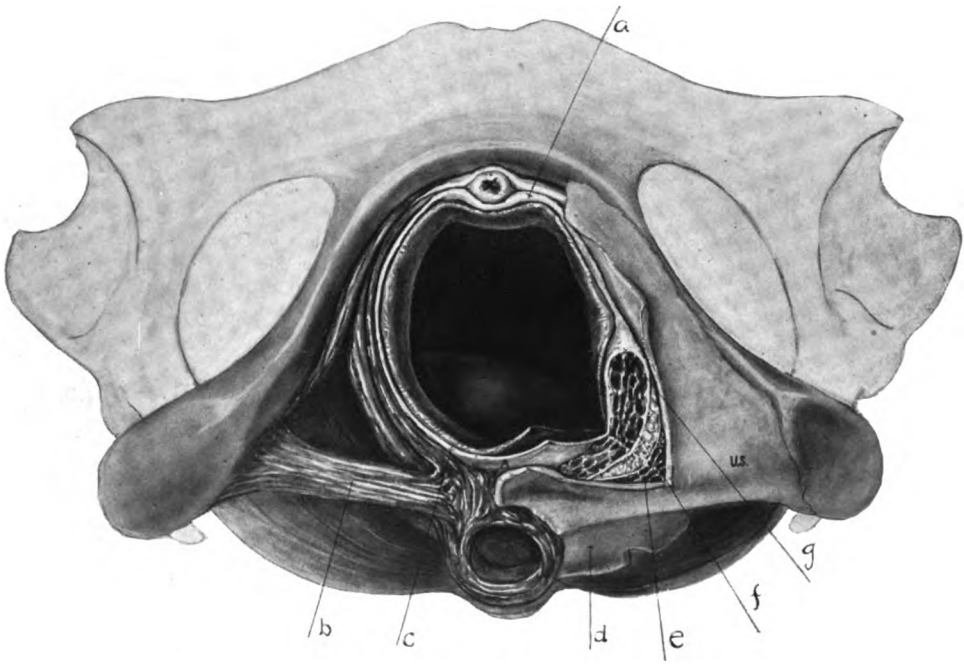

FIG. 4.—This model shows the dissection of the pelvic floor during the perineotomy. *U. S.*, Urogenital septum; *A*, the intercolumnar portion of the endopelvic fascia as it fuses with the urogenital septum in the centrum tendineum of the perineal body. On the left, the urogenital septum has been removed leaving the deep transversus perinei (enlarged) and showing the fusion of the levator ani fasciæ with the rectum. *a*, Vesicovaginal fascia (its destruction leads to cystocele); *b*, musc. transversus perinei profund. (exaggerated); *c*, fascia endopelvina portion called "Intercolumnar;" *d*, external layer of levator ani fascia. Floor of ischiorectal fossa; *e*, cut edge of deep transversus perinei muscle; *f*, levator ani pillar incised, pubic portion; *g*, fascia of levator ani.

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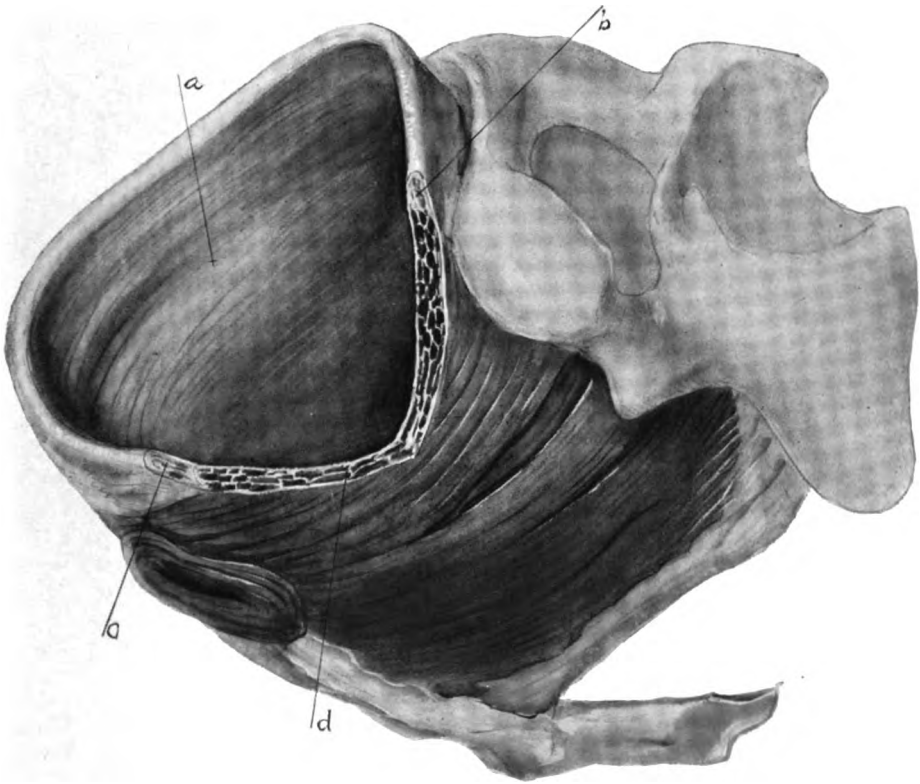

FIG. 5.—Condition of the muscles and fasciæ at time of exit of head after a deep perineotomy has been made. Note the short perineum, the anus pushed to one side, the intact fascia over the levator ani. Partly diagrammatic. *a*, fascia over levator ani not distracted or torn; *b*, urogenital septum not distracted; *c*, urogenital septum not distracted; *d*, levator ani pubic portion or "pillar" incised.

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so-called uterine ligaments. It is not necessary before a society of this kind to enumerate the immediate and remote effects of these destructions of tissue.

The dangers of the second stage of labor to the child are much greater than one who has not studied the matter thinks. It may surprise some present to know that the following injuries have been caused by the forces of natural, spontaneous labor: Fracture of the skull; rupture of the tentorium cerebelli; intracranial hemorrhage (numerous minute and large ones); retinal hemorrhage, abruptio retinæ, dislocation of the lens; facial paralysis; Erb's paralysis; rupture of the sternocleidomastoid muscle, already diseased, resulting in wryneck, fracture of all the long bones of all the extremities, rupture of the cord, tearing of the cord from the belly, etc.

The most common dangers, however, and therefore the most important, are asphyxia from abruptio placentæ or prolonged compression of the brain and intracranial hemorrhages. Brothers, of New York, found that 5 per cent. of children died during labor. Holt and Babbitt, of New York, 4.4 per cent.; Schultz 5 per cent. and 1.5 per cent. in twenty-four hours from the trauma of labor; Kerness, of Munich, found 5.2 per cent., and Potter, of Buffalo, had 4 per cent. fetal mortality. A certain portion of these deaths occurs in natural unassisted labor. How many babies are hurt and damaged in operative delivery cannot be determined, but their number is legion—and the same must be said of the effects of natural labor. Anyone who has thoughtfully studied the head of a child molded by strong pains through the tight pelvis of a primipara will agree with me that the brain has been exposed to much injury. The long, sausage-shaped head means that the brain has been dislocated; the overlapping bones indicate that the sinuses have been compressed with resulting cerebral congestion; the caput succedaneum evidences the pressure to which the brain was subjected. If there is a caput on the outside of the skull, what of the inside? The punctate hemorrhages in the skin confirm the last mentioned finding; the subconjunctival ecchymoses show us the possibility of hemorrhage in the

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retina. From outward visible evidences, therefore, we can deduce that the brain has suffered distortion, congestion, edema, compression and hemorrhages, but we need not rely on deduction alone. Clinically, if you listen continuously to the fetal heart tones you will be convinced that the child is suffering, and autopsies bring the final proof of the above assertions. Neurologists for many years have pointed out the connection between epilepsy, idiocy, imbecility, cerebral palsies and prolonged hard labors. Observant obstetricians have known this for so long that it is an accepted fact. In 1917, Arthur Stein, of New York, reviewed the literature on the subject; he studied 5562 cases in various homes for feeble-minded children and comes to the conclusion given above. Indeed, although the statistics are meager they seem to show that instrumental delivery is safer than prolonged, hard, unassisted labor. Stein's article is well worth reading, as it quotes numerous accoucheurs and neurologists of scientific standing who support this view. One may well ask himself whether the short, and moderate in amount, compression of the head in a skilfully performed forceps operation is not less dangerous to the integrity of the brain than the prolonged pounding and congestion it suffers from a hard spontaneous delivery. If a late forceps operation is done on a head and a brain already infiltrated with small hemorrhages the results are worse, compounded.

Anoxemia (anäerosis—the beginning of asphyxia) of the child in the second stage is a not uncommon condition, but fortunately most children are born before the asphyxia becomes fatal. In the Chicago Lying-in Hospital hardly a month goes by but that one or more infants die from this cause. Either the child is stillborn or dies a few minutes after birth or dies within the week from atelectasis. Most so-called blue babies are simply atelectatic. The asphyxia may be primary—from separation of the placenta, pressure on the cord, tetanic action of the uterus, etc., or it may be secondary to cerebral compression or hemorrhage. Its beginning and progress may readily and easily be determined by means of the stethoscope, indus-

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triously applied during the second stage. Another result of asphyxia in labor is infection of the fetus. In gasping for air the child inspires vaginal mucus and later develops pneumonia or intestinal sepsis.

Among the late effects of prolonged labor on the child must be mentioned permanent disorders of the special senses, sight and hearing, due to hemorrhages into the nerve endings, the nerve itself or its nuclei. Fetal deaths and all the complications are more frequent in primiparæ, as would be expected, even if the statistics and the history of primogeniture did not bear out the truth of the statement.

If we review all these things, and if we admit that they occur even in so-called normal labor, we must ask ourselves, Are we today doing all that our refined obstetric art permits to prevent damage and avoid disease of both mother and child? In other words, shall we depart from our old trusty, time-honored "watchful expectancy," *i. e.*, waiting for distinct signs of distress on the part of the mother or babe before interfering —or should we anticipate these dangers, and, as a routine, make the first stage of labor less painful and shorter and eliminate the second stage by a surgical delivery?

For the first stage, as stated before, we can do nothing safely except give narcotics, recommended in the form of a modified twilight sleep—unless we perform Cesarean section. It is surprising to me to receive requests from women for this method of saving them from even the pain of this part of labor. The most radical apostle of early surgical delivery is Potter, of Buffalo. In all cases, as soon as the cervix is fully opened (and oftentimes before), he completes the preparation of the soft parts manually and performs podalic version followed by immediate extraction. This practice has, and in my judgment, justly, evoked a storm of disapproval. In Potter's hands (perhaps) the operation is safe, but in less skilful hands there will undoubtedly be a long train of dead and damaged babies, ruptured uteri and torn soft parts. The same may be said, though with considerably less force, to what I recommend for the obstetric specialist—the operation of "prophylactic forceps."

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The radical interference with the mechanism of the third stage is intended to reduce the amount of blood lost, shorten the anesthetic period and reduce the danger of infection from retained blood-clots, membranes and insufficient uterine contraction.

Now the writer freely admits that this method of treating labor is a revolutionary departure from time-honored custom and must have really sound scientific basis for recommendation. This it has.

1. It saves the woman the debilitating effects of the suffering in the first stage and the physical labor of a prolonged second stage, and in the modern nervous inefficient product of civilization this is becoming more frequently necessary. The saving of blood, already referred to, has much to do with the quick and smooth recoveries I have observed in my cases. In the combination with morphin and scopolamin in the first stage, gas or ether in the second stage and operative delivery, we have robbed labor of most of its horrors and terrors, and we ought to thus favor the increase of the population.

2. It undoubtedly preserves the integrity of the pelvic floor and introitus vulvæ and forestalls uterine prolapse, rupture of the vesicovaginal septum and the long train of sequelæ previously referred to. Virginal conditions are often restored.

3. It saves the babies' brains from injury and from the immediate and remote effects of prolonged compression. Incision in the soft parts not alone allows us to shorten the second stage; it also relieves the pressure on the brain and will reduce the amount of idiocy, epilepsy, etc. The easy and speedy delivery also prevents asphyxia, both its immediate effects and its remote influence on the early life of the infant.

There are three objections to the innovation and one is a real one, but it will be, let us hope, only temporary. Prophylactic forceps will be made an excuse by unskilled, conscienceless accoucheurs for the hasty termination of labor, not in the interests of the mother or babe, but for their own selfish ends. I fear there are already too many forceps operations, and, therefore, I hesitated long before I decided to publish this

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method. But I have always felt that we must not bring the ideals of obstetrics down to the level of the general, the occasional practitioner—we must bring the general practice of obstetrics up to the level of that of the specialist. Let us trust each man to do honestly according to his limitations. For the one, watchful expectancy; for the other, prophylactic forceps.

The other two objections are the possibility of infection and the dangers to the child from an improperly performed forceps delivery, brain injury and compression of the cord. If the woman has an evident infection or if there is a suspicious leucorrhea the operation is contraindicated. In clean cases the matter of infection should not deter us. We practise a technic as painstaking as for laparotomy and have no fear of the results.

As for the forceps operation—in skilful hands the danger is *nil*. By means of the head stethoscope we are able to recognize danger to the infant from asphyxia, and since the resistances of the soft parts are gone, there is no compression on the child's brain. We should not blame the operation for faults made in its performance.

The results of this new method of treating labor are all that one could wish for. As yet no mother or baby has died and there has been no case of infection or cerebral hemorrhage. The babies have thriven; the mothers have not shown the exhaustion and anemia of olden days. The restoration of the parturient canal has been almost perfect—indeed, perhaps too near perfect. I have gotten the impression that involution is quicker and more complete; that retroversion of the uterus is rarer, and, all in all, the recovery much more rapid and satisfactory than with the older treatment.

DISCUSSION

DR. J. WHITRIDGE WILLIAMS, Baltimore.—I am sorry to say that there are only two things in Dr. De Lee's paper in which I entirely agree: The first is to allow the cervix to undergo

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spontaneous dilatation, and the second is the correctness of the general anatomical considerations which he has adduced. With the rest of it I do not agree. Doubtless Dr. De Lee, or the majority of those present, can deliver women in the manner he has described and leave them in better condition than had they been delivered in the usual way by the average practitioner. On the other hand, I believe that if his practice were to become general, and was widely adopted, the women would be worse off eventually than had their labors been conducted by midwives.

Recently I have inaugurated the practice of having all my patients come back to the hospital for reëxamination, one year after delivery, in order to determine how they have stood the strain of labor and what harm delivery has done them. In many instances I have been greatly surprised to find that they are in far better shape than one has any right to anticipate; but, on the other hand, I am occasionally surprised to find how marked a degree of relaxation may follow an easy spontaneous primiparous labor. Furthermore, I am quite convinced that if Dr. De Lee's practice should become general, and the women were examined in a similar manner, that they would be found to be worse off than the majority I see.

Passing on to what Dr. De Lee has said concerning the treatment of the third stage of labor, I do not hesitate to state that I think he has been perniciously active. In the great majority of cases it is unnecessary to introduce the hand into the vagina, as in most patients the fundus will be seen to rise up within ten minutes after the extrusion of the child, which indicates that the placenta has become separated from its area of attachment and lies in the distended lower uterine segment, while all that is necessary for its extrusion is the application of a slight *vis a tergo* by the obstetrician.

If I have understood Dr. De Lee correctly, it seems to me that he interferes nineteen times too often out of twenty. Of course, what I say applies to normal labors, but cases of hemorrhage must be treated in a totally different manner. I therefore believe, should his recommendation be generally adopted, that it would do an immense amount of harm and far counterbalance the good which it may accomplish in his expert hands.

PRESIDENT DICKINSON.—We have the great honor of having with us a distinguished English obstetrician, and I am going to ask Dr. Eden, of London, to discuss this paper.

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Dr. Thomas Watts Eden, London, England.—I doubt very much whether this is a prophylactic procedure that Dr. De Lee has described to us. He says he prevents laceration which will result later in prolapse. He has made admissions on the subject, however, which I think we should not overlook. In the first place, he says he cannot prevent injury which occurs to the pericervical fascia, because that injury to fascia is due to dilatation of the cervix. It is, however, the injury to that fascia which is the cause of cystocele, and this operation therefore cannot prevent cystocele. Is it possible for this operation to prevent diastasis of the levator ani muscles and the fascia which covers them? The time at which he does his operation is when the head reaches the pelvic floor; at this moment it is lying between the levator ani muscles which are already widely separated, although not to the maximum extent. He also admits by his experience that he cannot entirely control laceration, as laceration continues after he has already made the incision. It seems to me that this is an operation which will have no effect at all in preventing one troublesome form of prolapse, and can only partially prevent any form of prolapse which may result from laceration of the perineum. But perineal laceration, unless deep and extending into the rectum, is not followed by prolapse at all, and therefore it is not possible for this operation to prevent anything like 100 per cent. of cases of prolapse.

It seems to me, there are other serious objections to the operation. I am in favor of keeping the management of normal labor as simple a process as possible. We have got to remember that the number of laborers in hospitals is small; the majority of women are confined in their own homes under the care of general practitioners but this is a hospital stunt, not one for the general practitioner. Students are coming to the hospital, they see this operation, they will do it because they have seen it done, and the results will be very different from what they are in his hospital. We ought to make the conduct of normal labor as simple a proposition as possible, because taking the country at large it is in the hands of comparatively unskilled men, and the harm which may be done by meddlesome methods may in a few years become widespread. What is the matter, as a preventive, with properly sewing up the ordinary perineal laceration which is so frequently found? If doctors would all sew up these lacerations properly by vaginal stitching, in my opinion

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we would do more to prevent prolapse than by Dr. De Lee's operation.

DR. JOHN O. POLAK, Brooklyn, New York.—I think the point of Dr. De Lee's paper is to distinguish between what is safe for a specialist to do and what is safe to teach students to do. I am in agreement with a great many of the points Dr. De Lee has brought out, particularly his use of an anodyne for the dilatation of the cervix, and this brings out the point that I have inspected a very large number of cervices after pituitrin has been used, when the entire cervix has been effaced and the diameter has been at least 7 cm., and have seen these cervices torn with a fresh tear extending up into the fornices.

In regard to the delivery, he does save something. He saves more children by auscultation of the fetal heart when the head is on the pelvic floor than by discission of the pelvic floor. We have saved more children since we have adopted this routine in the last six years.

I do not agree with his lateral discission. I do not believe, from the results I have had with it, that it compares with the suggestion Dr. Pomeroy brought forward before the Society, of median discission, and these are the reasons: You cannot get union of a belly of a muscle as you can get fascial union. Allowing the head to remain on the pelvic floor for a long time dilates, as the doctor has said, the median fascia. Furthermore, it does something else, it dilates the anterior facia. I have seen these women who have had spontaneous labor come back with cystocele as a result of the prolonged second stage of labor. As Dr. Pomeroy has suggested, we now make a median discission after stretching the sphincter in these cases, and we have as a results several hundred women with pelves and anterior pelvic fascia absolutely intact, such as we never got before. Since we have watched other men and have seen their results, I am convinced that episiotomy is a prophylactic procedure both in the interest of the child and the woman's pelvis, whether you do it to the side, as Dr. De Lee does, or in the median line.

I am not at all in accord with his teaching about the third stage of labor. While, with the woman under an anesthetic, I agree with him that you can push the placenta out, as a rule it is far better, to my mind, and you have less trouble, as was shown in the work we did some years ago, by leaving the placenta

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alone. We got a minimum amount of hemorrhage by leaving these placentæ absolutely to themselves. Dr. Williams reports that the quantity of hemorrhage is in excess of what we have had. We have averaged a little less than 250 c.c. in 100 cases.

DR. HENRY T. BYFORD, Chicago.—I think the whole gist of the subject is that of Dr. De Lee recommending this procedure in all cases. There is no doubt but what this should be done in cases in which the fascia begins to separate and injury is going to occur. The fact that so many cases get well of themselves, where they are left to nature, shows that the procedure should be used in the concrete not as a routine method.

DR. EDWARD P. DAVIS, Philadelphia.—We should teach third- and fourth-year students how to deliver normal cases without interference, and tell them to wait twenty minutes or half an hour for the placenta to come away. If a student has an abnormal case of labor to deal with that is complicated, it is as grave a case as an ovarian tumor, he should summon expert opinion, and that patient should go to a hospital for forceps application, embryotomy, or other procedure. I cannot see that the procedure advocated by Dr. De Lee is applicable. The fasciæ do not become obstructed necessarily until labor is fully established. When natural labor begins, if anything is done, let it be done thoroughly and surgically under anesthesia.

DR. JOSEPH B. DE LEE, Chicago (closing the discussion).—I regret very much I did not have five minutes more to complete my paper, because a number of points subsequently raised would have been clarified.

First, as regards the danger of this operation and the matter of interference in natural labor. I consider the operation I have described is much less dangerous than the use of pituitrin to induce labor, and the use of bags to induce labor at term as has been recommended to you today. I consider these procedures much more radical interferences than the method described. In the second place, one danger only exists, *i. e.*, doctors who have no business to do the operation are going to do it. That is unfortunate and unavoidable, and I will say no more about this phase of the subject.

Women clamor for relief from the dangers and disabilities

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of childbirth, and we have got to afford them relief. They are tired out; they are neurasthenic; they have backache, rectal and bladder trouble, and they say they never have been well since the baby was born, and we have got to do something to prevent these bad sequelæ of labor. They even beg for Cesarean section to escape the dangers and pain of childbirth. They will tell you that Mrs. So and So, who had a Cesarean section done, has no backache, while they have.

Regarding what Dr. Williams said about introducing the hand into the uterus: It is unnecessary to put the hand high into the uterus by this method. The placenta pouts down into the vagina under the influence of pituitrin, and all you have to do is to press on the fundus and it falls into the basin. Where it does not come out of the vagina you put your hand into the cervix, and the placenta will slide down like the heel along a shoehorn. I am not afraid to put my hand into the uterus.

Regarding the remarks of Dr. Eden—if he had heard the rest of my paper he would have learned what incision of the pelvic floor and perineum prevents. It absolutely prevents cystocele. There is extreme circular tension of the fascia at the pelvic outlet; an incision in the posterior quadrant of the fascia relieves pressure on the pubo-uterine ligaments, the subvesical or vaginal fascia (which is so important in the operation for cystocele), and if the operation of prophylactic forceps does nothing else than to prevent cystocele, I would present it to you with supreme confidence.

Dr. Eden stated that the levator and pillars are already separated when I do the operation. That is not so. The right time to perform the operation is when the levator ani just begins to feel the crushing effect of the head.

About sewing up lacerations that occur in natural delivery, I wish to say that I have sewed up thousands of lacerations after delivery and have never been fully satisfied, and I claim no lack of skill; when I sew up a perineotomy wound I can distinguish fascia and muscles beautifully. When I get a laceration to sew up, where the head has been pounding and grinding the muscle like a piece of steak is pounded with a mallet, I cannot get good results.

In what other respect is the procedure prophylactic? Where the baby's head is crowded through a contracted brim you know what has happened to the brain, what has happened to

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all the vessels in the brain. There are minute and larger hemorrhages. The same is true when a head is driven through a tight outlet. *Caput succedaneum* I referred to in the paper.

In going over the history of primogeniture we learn that the first-born had a high mortality and morbidity and that children of subsequent labors, not the first labors, were people who moved the world. Benjamin Franklin was the seventeenth child.

I say that this procedure saves the mother from exhaustion and hemorrhage. I disagree with those who say that women may lose 500 c.c. of blood with impunity. The less blood a woman loses at labor, the better.

Dr. Byford said something about the number of cases that go through labor spontaneously and have good perineums. I have yet to see an anatomically perfect perineum in a woman that has had a spontaneous delivery of a normally large child at term. I have had in the last two years over 200 private cases, and of this number 85 were forceps applications and 39 of prophylactic forceps. I do not do the operation in every case. Most of the cases of multiparæ with large pelves do not need prophylactic forceps.

In the remarks made by Dr. Davis he implied that what we teach our students is different from what we practice, and I agree that we should teach this method only to our advanced scholars.

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THE VALUE OF THE WASSERMANN REACTION IN OBSTETRICS, BASED UPON THE STUDY OF 4547 CONSECUTIVE OBSERVATIONS

By J. Whitridge Williams, M.D.,
Baltimore

I have always been interested in the relations between syphilis and obstetrics. This interest originated in connection with the microscopic examination of the placenta, which has been a routine procedure since the beginning of our service, with the result that we have now available the records of 20,000 such examinations. This study soon taught me that lesions frequently occur in that organ which are characteristic of syphilis and which enable one to detect the disease in many cases in which its existence is otherwise unsuspected.

When the Wassermann reaction was first described I welcomed it as an additional aid in diagnosis, and immediately began to compare the results obtained by its means with those following the microscopic examination of the placenta. For a number of years, however, I employed it only when something in the history of the patient suggested the possible existence of syphilis. Although my investigations had shown that syphilis was a frequent complication of pregnancy and was one of the common causes of fetal death, I did not appreciate its full significance in obstetric work until 1915. At that time I studied the fetal and infantile deaths in a series of 10,000 consecutive deliveries, and in my presidential address before the American Association for the Prevention of Infantile Mortality, I stated that syphilis was the most important

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single cause and constituted the etiologic factor in 26 per cent. of the deaths occurring in my service between the end of the seventh month of pregnancy and the two weeks immediately following delivery.

As the result of that study, I concluded that the most immediately fruitful field for prenatal work lay in the earliest possible recognition of the existence of syphilis and its intensive treatment during pregnancy, and that this could best be accomplished by making a Wassermann test upon every patient entering the service. Consequently, from April, 1916, to the present time a specimen of blood has been withdrawn from every patient at her first visit to the dispensary, and if a positive Wassermann is obtained she is subjected to intensive treatment in the syphilitic department of the hospital. Furthermore, in the hope of increasing our knowledge concerning the incidence of the disease, as well as its clinical significance for the mother and child, a Wassermann is likewise made from a sample of fetal blood obtained from the umbilical cord immediately after delivery. Every placenta is weighed and described macroscopically, after which portions of it are hardened, cut, stained and subjected to microscopic examination. Finally, whenever the child is born dead or dies within the first two weeks of the puerperium, every effort is made to secure an autopsy, at which particular attention is paid to the detection of syphilitic lesions, and a positive diagnosis is not made unless spirochetes can be demonstrated in the fetal organs.

The present work is based upon the study along these lines of 4000 women and their children who were delivered in the service, out of 4547 admissions, between April, 1916, and December 31, 1919. The patients were almost equally divided between whites and blacks, though the latter slightly predominated, 1839 and 2161 respectively.

On this occasion I shall refer incidentally to the part played by syphilis in the causation of fetal death, then I shall consider more fully the significance of the maternal and fetal Wassermann, and finally I shall consider briefly the value of

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the microscopic examination of the placenta in the detection of syphilis and finally say a few words concerning the status of Colles's law. I am able to make the remarks concerning syphilis as a cause of fetal death comparatively brief, for the reason that the subject was considered in detail in my article on "The Significance of Syphilis in Prenatal Care and in the Causation of Fetal Death," which appeared in the *Bulletin of the Johns Hopkins Hospital,* May, 1920.

That article was based upon the study of 302 fetal deaths, 99 whites and 203 blacks, which occurred in the 4000 deliveries under consideration. It showed that syphilis was the most important single cause of death and that it was responsible for 34.4 per cent. of the total number. These figures did not include the children discharged alive with hereditary syphilis nor those in whom the disease developed later. Furthermore, it was shown that syphilis was responsible for more than twice as many deaths as the next most important cause, namely, dystocia, as well as for nearly as many deaths as the next three most common causes combined, namely, dystocia, toxemia and prematurity. My figures indicated that these three causes were responsible for 37 per cent. of the deaths as compared with 34.4 per cent. for syphilis. At the same time I pointed out the great difference in the incidence of the disease in the two races; syphilis being responsible for 12 of the 99 white as contrasted with 92 of the 203 black deaths, an incidence of 1 to 8 and 1 to 2 respectively.

After these preliminary remarks I shall pass on to the study of the significance of the Wassermann reaction in pregnant women. In the 4000 women delivered during the period under consideration, 449, or 11.2 per cent., presented a positive reaction during pregnancy. Its incidence was much greater in the black than in the white women, being 16.29 per cent. and 2.48 per cent. respectively. In other words a positive Wassermann was noted in every sixth colored woman as compared with every fortieth white woman.

It is comparatively easy to collect the gross figures, but

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when we attempt to determine their significance we immediately fall into very great difficulty, as we are brought face to face with a number of conditions which we cannot at present satisfactorily explain.

Chart I gives an idea of the complexity of the problem. The 449 cases included in it are arranged in three great groups, according as the patients were not treated at all, were treated imperfectly or were well treated prior to delivery. In each of these groups there are a number of subdivisions, amounting to 24 in all, which indicate, as far as possible, the condition of the child, the microscopic findings in the placenta and the results at autopsy. By way of explanation it may be said that the treatment was regarded as efficient only when the patient had been given a course of five or six injections of salvarsan followed by mercurial treatment, which resulted in a permanent disappearance of the positive Wassermann. Under inefficient treatment were included such patients as had received one or more injections of salvarsan but in whom for one reason or another the course of treatment had not been completed; while, of course, no explanation is required for the patients who received no treatment except in so far failure to give it is concerned. In most cases in this category the failure was due to the fact that the women were registered late in pregnancy and fell in labor before treatment could be instituted, while, occasionally, it was due to the fact that the patients did not return for treatment after having been directed to do so.

With these figures before us it may be asked, What is the significance of a positive Wassermann occurring in a pregnant woman? Does it inevitably mean that she has syphilis, and will she transmit the disease to the child? Concerning the first question I am not prepared to give a conclusive answer, although I shall have more to say concerning it in the section devoted to Colles's law; but concerning the second question, our observations permit a definite statement to the effect that the existence of a positive Wassermann on the part of the mother does not necessarily mean that her child will develop syphilis. [See Chart I.]

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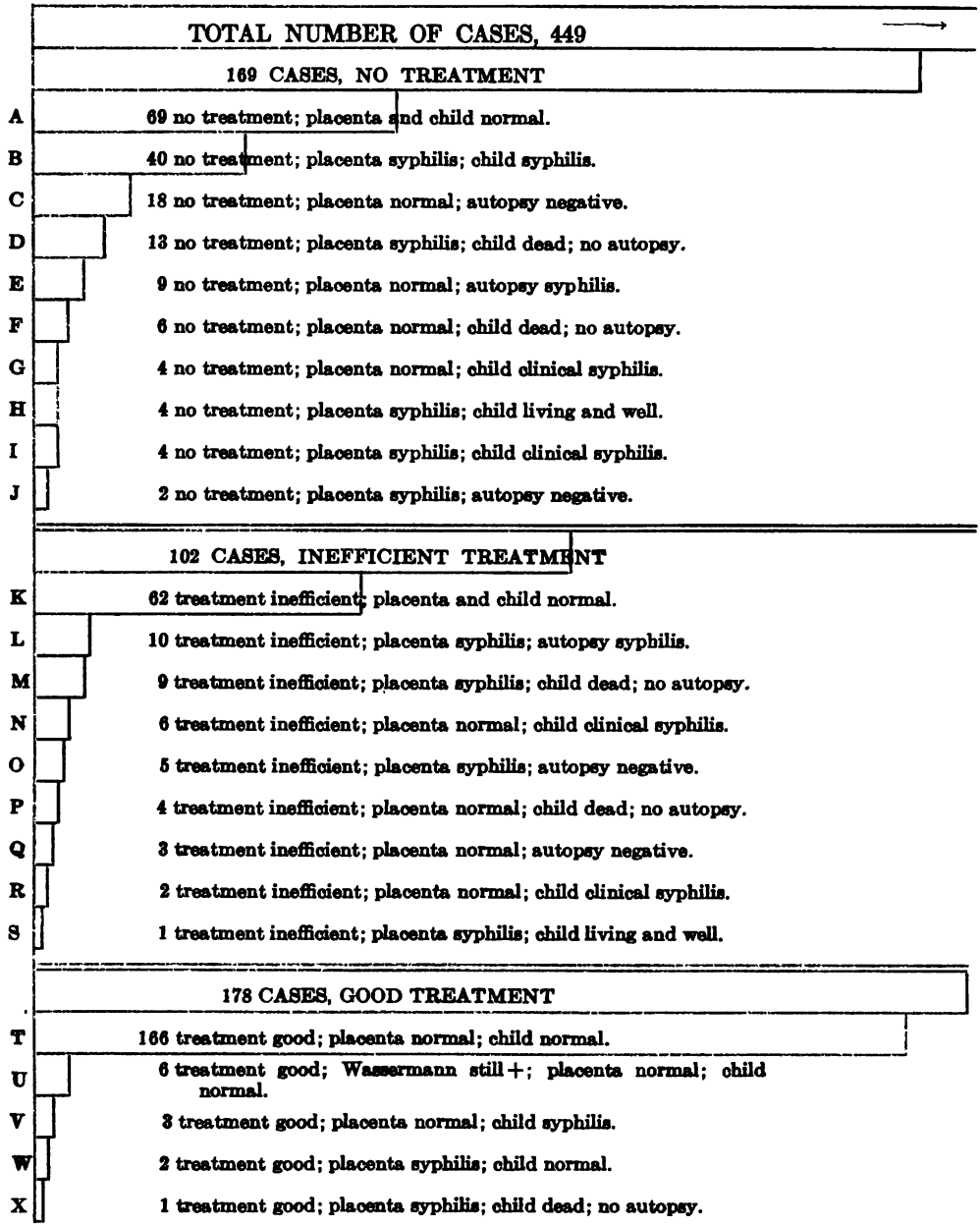

CHART I.—Graphic analysis of results in 449 women presenting a positive Wassermann ($\frac{1}{16}$ inch to case):

169 patients with no treatment had 48.5 per cent. syphilitic children.
102 patients with inefficient treatment had 39.2 per cent. syphilitic children.
178 patients with efficient treatment had 6.7 per cent. syphilitic children.

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This is clearly demonstrated by the consideration of the untreated cases included in Chart I. Our figures show that 87 of the 169 children concerned (A and C), or 51.5 per cent., were discharged in good condition, or were born dead or died during the puerperium but presented no signs of syphilis at autopsy. Moreover, in all of them the microscopic examination of the placenta was negative. On the other hand 57 children presented either clinical or anatomic evidences of syphilis (B, E, G and I). In 19 other cases the placenta was syphilitic and thus raised the assumption that the child was likewise suffering from the disease. Closer study, however, shows that such is not inevitably the case; as in 4 instances (H) the children were discharged in good condition, while in two others (J) they died but showed no signs of syphilis at autopsy. In 13 cases (D) the children died but did not come to autopsy, so that a positive statement as to the cause of death cannot be made, although the presumption is that it was due to syphilis. Finally, in six other cases (F) the placenta was normal, but the dead children were not autopsied. In this group, likewise, a positive answer cannot be given, although the presumption is that syphilis was not the cause of death. In other words, of the children born to 169 women presenting a positive Wassermann during pregnancy, but not subjected to treatment of any sort, 51.5 per cent. showed no evidence of syphilis, 33.7 per cent. had definite syphilis, while in 14.7 per cent. the results were doubtful. Consequently, it appears conservative to assume that the evidence at our disposal indicates that less than one-half of such women, and possibly even a smaller number, will have syphilitic children.

Chart I also gives a striking example of the beneficial effect upon the child of treatment administered to the mother during pregnancy. Thus while 51.5 per cent. of the children of the 169 women who were not treated showed no signs of syphilis, 66.8 per cent. were free from the disease in the 103 women who were inefficiently treated as contrasted with 93.6 per cent. in the 178 women who were well treated. Or, to express it in another way, the incidence of syphilis was 48.5, 33.2 and 6.7

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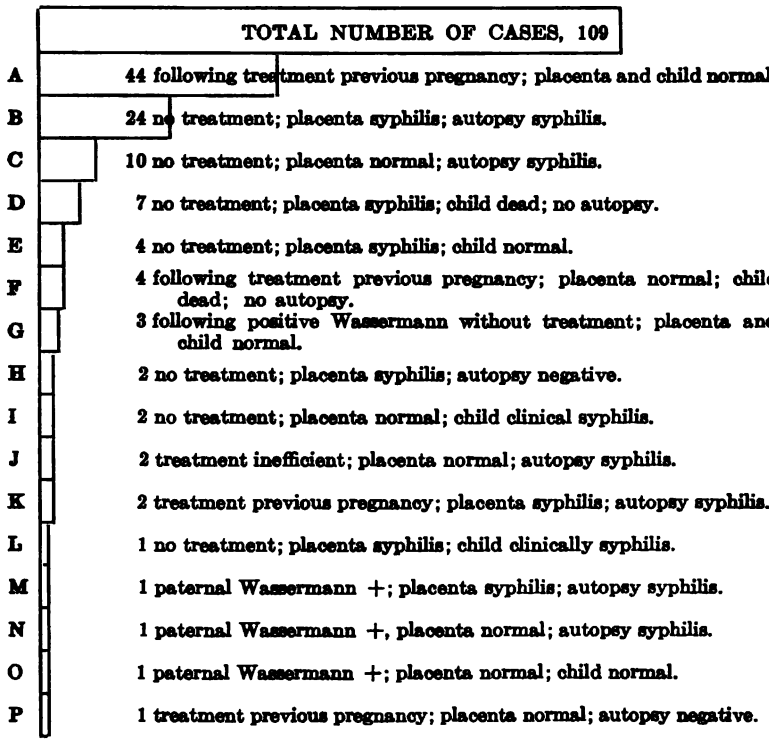

CHART II.—Graphic analysis of 109 cases in which the maternal Wassermann was negative, but in which some mention of syphilis was made in the history ($\frac{1}{16}$ inch to case).

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per cent. in the three groups respectively. Such figures are extremely encouraging and might tempt one to conclude that ideal prenatal care might lead to the total abolition of syphilis in the child. Such a conclusion, however, is too roseate, and as the sequel will show is not justified. [Chart II.]

Chart II gives a totally different aspect to the question. It is based upon 109 other women in the series who presented a negative Wassermann during pregnancy but in whose history some mention of syphilis was made. Roughly speaking, these women may be classified in four categories: *(a)* those who had presented a positive Wassermann in a previous pregnancy, but who had been treated and apparently cured; *(b)* those in whom autopsy upon the child conclusively demonstrated the existence of syphilis; *(c)* those presenting a positive placenta and an apparently normal child; and *(d)* cases in which the paternal Wassermann was positive. Upon analyzing the cases in this group we find that 44 women had been effectively treated in a previous pregnancy and may be regarded as having been cured of syphilis, leaving 65 for consideration. These 65 women had 54 dead and 11 live children. Forty-three of the dead children came to autopsy and 11 did not; 40 of the former were definitely syphilitic while 3 were not. Seven of the 11 children which were not autopsied (D) had positive placentæ and presumably were syphilitic, while in 4 (F) the placenta was normal and the mother had been treated in a previous pregnancy. Of the eleven children which were born alive three presented characteristic lesions of hereditary syphilis (I and L); while 8 were discharged in good condition (E, G and O). Concerning the three cases in subdivision G, more will be said in the section dealing with Colles's law.

In other words, of the 65 children under consideration 43 were definitely syphilitic, 11 others died but were not autopsied, 3 gave negative results at autopsy and 8 were discharged in good condition.

What does this mean? At first glance it would appear to invalidate almost entirely the value of the routine Wassermann in obstetrics, but a little further consideration indicates

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that so pessimistic a conclusion is not justified. All that we can say positively is that 43 syphilitic children were born to 65 women who presented a negative Wassermann.

What this means serologically it is impossible to state at this time, but practically it means that in our material about one baby in one hundred (43 out of 4000) will have syphilis even if the maternal Wassermann is negative, and consequently one is not justified in claiming that the most ideal prenatal care can entirely eradicate the disease as a cause of fetal death. Of course, in practice the results will not be quite so bad as here indicated, for the reason that the condition would probably be recognized after the birth of the first syphilitic child, when the mother would be properly treated with a reasonable prospect that future children would be exempt from the disease.

The practical bearing of this aspect of the problem may perhaps be elucidated by a little calculation. For example, if it is assumed that 11 per cent. of our women have a positive Wassermann and that without treatment one-half of their children would be syphilitic, we should expect 55 syphilitic children in every 1000 plus 10 others (1 per cent.), which would be born of women with a negative Wassermann, or a total of 65 per 1000. Consequently, our figures indicate that even though routine Wassermann tests were made early upon all pregnant women and efficient treatment instituted at once, only five-sixths ideal results would be obtained. Of course, this would apply only to the first delivery in the service, as in the women with negative Wassermanns the existence of syphilis would be detected after the birth of the first child, when treatment would be immediately instituted afterward, and be followed by excellent results in the future.

Generally speaking I feel justified in concluding that such a result should not discourage us, for if we were able to reduce the fetal mortality from syphilis by five-sixths, its eventual incidence would scarcely exceed 1 per cent., and it would be converted from the most common cause of fetal death into an infrequent one.

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Turning to the consideration of the significance of the fetal Wassermann at the time of delivery, our material shows that a positive result was obtained in 36 of the 4000 observations, approximately 1 per cent. This means that only a small fraction of the children born of mothers with a positive Wassermann present such a reaction. It should, however, be remembered that macerated children are not available for the tests, as their blood is already "laked."

In order to arrive at a conclusion as to the value of such investigations, we have attempted to determine the fate of the 36 children concerned. For this purpose they were visited at their homes, were subjected to a careful physical examination, and a sample of blood was removed in order that the Wassermann might be repeated. As three years had elapsed since the oldest cases had been discharged, it is not surprising that 9 of them could not be located, thus leaving 29 available for consideration. Fourteen of the children died within the first month, mostly in the service, and in 12 of them syphilis was demonstrated. Five of the children developed clinical syphilis later while ten others presented no clinical signs of the disease. In these a Wassermann repeated months or years after the original gave positive results in five children, while it was negative in the other five.

In other words, out of the 29 children which presented a positive Wassermann at birth, 17 developed definite evidences of syphilis, 5 showed no clinical signs but continued to have a positive Wassermann, while 7 showed no signs in association with a negative Wassermann. Accepting the positive Wassermann as conclusive evidence of the existence of syphilis in the child, it appears that the primary reaction corresponded with the clinical and anatomic findings in 76 per cent. of the cases.

At first glance these figures would seem to indicate that the fetal Wassermann is of considerable prognostic value, and indicates that the great majority of children presenting it either have syphilis or will develop it later. The validity of such a conclusion, however, is put in serious doubt when it is

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attempted to trace what happened to the children who presented a negative Wassermann at birth. I have attempted to follow up all the children which were discharged from the service in good condition in order to learn their subsequent history and to obtain a subsequent Wassermann. Unfortunately this is often extremely difficult, as many of the mothers move away and give their neighbors no information concerning their new location, so that it is impossible to find them except by accident. We have, however, examined a large number of such children, and among them have thus far found ten whose Wassermann at birth was negative, but now is positive. In view of these findings, we are forced to the conclusion that a positive Wassermann at birth does not necessarily imply that it will remain so, and conversely that a negative Wassermann at birth does not necessarily mean that it may not become positive later.

Upon analyzing our case from another point of view, we find upon deducting the children dying within the first month, as well as those which presented signs of clinical syphilis, that we have 10 left, none of whom presented clinical signs of the disease. In 5 of these the positive Wassermann persisted while in the other 5 it had become negative. What will eventually happen to the first group can only be determined by subsequent study.

With these results before us I feel that we are justified in concluding that the information obtained by the Wassermann made from the fetal blood at birth is not commensurate with the time consumed nor the money expended. That I am not alone in this opinion is shown by the investigation of Fildes, who in 1915 reported that he had found a positive Wassermann at the time of birth in 14 out of 1015 children, or 1.3 per cent. Prolonged observation showed that only one of them developed clinical syphilis. Seven of the others who were examined later presented a negative Wassermann, while in 3 children the original negative Wassermann later became positive. Consequently he felt justified in drawing conclusions identical with those indicated above.

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During the course of years I had become convinced from the routine microscopic study of the placenta that the syphilitic lesions occurring in it are extremely characteristic and afford more conclusive evidence of the existence of syphilis than the demonstration of a positive maternal Wassermann, and in general tally fairly closely with the autopsy findings in the child. For this reason I was curious to ascertain in how far the results of the present study would sustain such conclusions.

Chart III gives a graphic picture of the relation between the microscopic findings in the placenta and the clinical and anatomic condition of the child based upon the study of 547 cases. The chart represents the combination of the 449 women presenting a positive Wassermann as shown in Chart I and the 109 women presenting a negative Wassermann as shown in Chart II, and should include 558 cases. The difference between that figure and the one mentioned is due to the loss of 11 placental preparations. It may here be stated that in the preparation of the material upon which this study is based the microscopic slides from every placenta concerned were reëxamined for the purpose of verifying the diagnosis.

Upon referring to Chart I we find that a positive Wassermann was originally obtained in 449 women, which later became negative in 172 out of the 178 women who had been efficiently treated, so that 277 cases are available for ascertaining in how far a positive maternal Wassermann corresponds with the existence of the so-called microscopic lesions of syphilis of the placenta, or with the presence of positive clinical symptoms or with positive autopsy findings in the child. Upon analyzing our figures upon this point, we find that the two correspond in 109 instances (B, D, E, G, H, I, J, L, M, N, O, R and S) and fail to correspond in 158 instances (A, C, K, Q and U); while in 10 other instances (F and P), in which the placenta was normal but the dead child did not come to autopsy, no conclusion could be drawn. In other words, in this series the maternal Wassermann tallied with the placental or fetal findings in 39.35 per cent. and failed to tally in 57 per cent. of the cases, while in 3.6 per cent. the conditions were such that a positive conclusion could not be reached.

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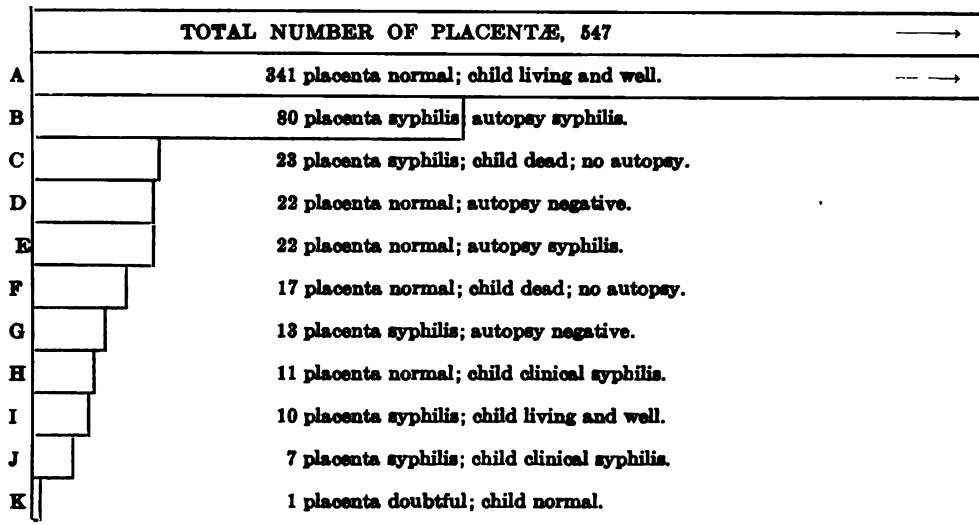

CHART III.—Graphic analysis of results of microscopic examination of 547 placentæ from patients included in Charts I and II ($\frac{1}{16}$ inch to case). The difference between 558 and 547 is due to the fact that the sections from 11 placentæ were lost, and consequently could not be verified.

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It would consequently appear that since there are only 4 chances out of 10 of the results corresponding, it is hazardous to attempt to draw any conclusion concerning the condition of the placenta or the child from the presence of a positive maternal Wassermann during pregnancy.

Of course, it may be objected that such a deduction is not justifiable because of the fact that 102 women who received imperfect treatment during pregnancy had been included in the series, and such a possibility must be admitted. On the other hand, information not susceptible to such a criticism may be obtained by restricting our inquiry to the 169 women who received no treatment of any kind. Upon deducting the 6 questionable cases in subdivision F we have 163 untreated cases, and of these 67 tallied and 96 failed to tally—42 and 58 per cent. respectively—or essentially the same incidence as before.

The problem may be approached in another way: Upon comparing the placental findings in Chart III with the condition of the children and taking no account of the Wassermann reaction, it is noted that in 451 instances (A, B, D, J and K) the results tally while in 56 instances (E, G, H and I) they do not. Among them are included the 40 cases in the groups C and F in which the dead child did not come to autopsy, and consequently a positive statement could not be made as to its condition. In other words, in the 547 placentæ concerned the results failed to tally in 17.5 per cent., while upon deducting the 40 questionable cases the figure becomes reduced to 11.9 per cent.

Furthermore, we may attempt to solve the problem from still another point of view, and we can compare the degree of correspondence according as the placenta was normal or definitely syphilitic. In the 414 cases included in the former category we note the following results: In 342 the child was discharged alive and well, in 22 it was dead born, but autopsy revealed no evidence of syphilis; while in 22 others autopsy showed that death was due to syphilis, and in 11 the live child presented characteristic lesions of clinical syphilis; while 17

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dead children did not come to autopsy. Upon deducting the last 17 cases in which no statement concerning the cause of death is permissible, we find 397 normal placentæ associated with 364 non-syphilitic children. In other words, the results tally in 91.6 per cent. On the other hand, in the 133 cases in which the placenta was definitely syphilitic our figures show 80 dead children with positive autopsies, 7 children with clinical syphilis, 13 children dead but with negative autopsies, 10 children discharged alive and well and finally 23 children which died but did not come to autopsy. Upon deducting the latter we have 110 syphilitic placentæ associated with 87 syphilitic children, a correspondence of 79.1 per cent.

From our calculations it appears permissible to assume that the present investigation indicates that the microscopic examination of the placenta tallies with the clinical and anatomic findings in the child in from 80 to 90 per cent. of the cases, which is in marked contrast to the 40 per cent. obtained from a positive maternal Wassermann. Consequently, I am glad to find that this study confirms my previous impression and indicates that the demonstration of the so-called Fränkel's disease in the placenta offers twice as great a probability of giving correct information concerning the condition of the child as a positive Wassermann on the part of the mother, and in the absence of a carefully conducted autopsy constitutes the most reliable means of diagnosis at our disposal.

In 1837 Abraham Colles announced that it was possible for a syphilitic father to engender a syphilitic child by a normal mother and that the latter would remain immune to infection from her own child while others might be infected by it. So much clinical evidence was gradually accumulated in support of the correctness of this statement that it became accepted as a dictum and is known as Colles's law.

Such an occurrence presupposes infection of the ovum by means of the spermatozoa, with the subsequent development of immunity on the part of the mother. Presumptive evidence in its favor is afforded by the fact that comparatively few mothers of syphilitic children present a history of primary

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infection and frequently give birth to a series of syphilitic children without developing signs of the disease later. Fournier was an ardent believer in the doctrine, and his advocacy of the occurrence of so-called conceptional syphilis, or *choc en retour,* lent still further support to the probability of paternal infection. Indeed, it may be said that Colles's law was almost universally accepted up to 1903, when its applicability was denied by Matzenauer.

This is not the place, nor will time permit me to trace the history of the controversy, except to say that with the discovery of the spirochete in 1903 and the description of the Wassermann reaction in 1907 more and more doubt has been cast upon the correctness of Colles's law, with the result that at present most writers, with the exception of Hochsinger, Boas and Routh, absolutely deny its possibility both upon clinical and so-called scientific grounds.

The reaction was apparently placed upon a firm basis by the contribution of Bab, who pointed out that the relatively large size of the spirochete as compared with that of the spermatozoön, made it *a priori* improbable that the former could be carried into the ovum by means of the latter. Consequently he contended that the possibility of paternal infection must be denied unless the existence of some sporal or intermediate form of the spirochete were demonstrated. As no such evidence has been adduced he is inclined to deny the applicability of Colles's law. Furthermore, when the blood of pregnant and puerperal women who were supposed to exemplify that law was examined it was almost uniformly found to present a positive Wassermann reaction. Consequently those interested in the subject concluded that the reason the mother did not become infected by her child was that she was already suffering from the disease, which for some unexplained reason existed in a latent form, and in many instances did not give rise to the usual manifestations.

It must be admitted that such reasoning is very plausible, and to a certain extent justifies the skepticism of those who cry—"Away with Colles's law." Indeed, most arguments in

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its favor are far from convincing, and the recent one—advanced by Routh, according to which infection of the ovum is infected by means of "gemmules" derived from the spirochete—is devoid of scientific basis; although if its correctness could be demonstrated it would solve many problems.

Notwithstanding the plausibility of the arguments against the correctness of Colles's law, my clinical experience has been such as to cause me to wonder occasionally whether such skepticism is entirely justified, and, while recognizing the difficulties in the way of adducing convincing evidence in its favor, to inquire whether it would not be more rational to regard the question as still *sub judice* rather than as actually disproved.

In the first place the history of certain mothers of definitely syphilitic children seems to indicate that if they are really the subjects of latent syphilis the disease must be of a very different type from that usually encountered. Upon going over the histories of the women presenting a positive Wassermann in our series only a few could be found who gave any evidence of having had a primary sore, while in less than 20 per cent. could a history of the usual secondary or tertiary manifestations be elicited. Furthermore, upon reviewing the patients who had been in the service for many years, and many of whom had not been treated, we failed to encounter any who had exhibited the usual sequelæ of the disease.

Menten had a similar experience and reported that she had been able to elicit only a single history of definite infection in 48 women presenting a positive Wassermann during pregnancy. As the difficulty of detecting the primary lesion in women is generally recognized, it must be admitted that such negative evidence is of less value than in men; but if a positive Wassermann during pregnancy be accepted as indubitable evidence of the existence of latent syphilis, I cannot rid myself of the impression that the disease must vary markedly from the usual type.

In this connection one cannot avoid considering the possibility that a positive maternal Wassermann during preg-

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nancy may occasionally be regarded as a manifestation of the establishment of active immunity on the part of the mother against a syphilitic product of conception. Of course, this implies the acceptance of spermatic infection, but if such a possibility were once admitted, for which at present there is no scientific basis, it would be easy to comprehend the mechanism by which such immunity might be established from what we know concerning the invasion of the maternal by fetal tissues and concerning the deportation of chorionic villi during pregnancy.

Suggestive evidence along such lines was afforded by three cases in the present series. In each of them the patients who presented a positive Wassermann, and were not treated during pregnancy, gave birth to syphilitic children, but upon repeating the Wassermann some weeks or months later we were surprised to find that it had become negative. That this is not an isolated experience is shown by the fact that Menten, upon repeating the Wassermann within two weeks after labor upon 26 women, who had exhibited a positive reaction during pregnancy but who had not been treated, found that it had become negative in 14 and had remained positive in 12 cases. By means of various controls she convinced herself that the conversion could not be regarded as due to errors in technic, and consequently she concluded that it resulted from some deep-seated change in the economy of the women. Furthermore, Dr. Albert Keidel, of the syphilitic division of the Johns Hopkins Hospital, informs me that such changes are not unusual in his experience. No satisfactory explanation has yet been offered in explanation of this phenomenon, so that all that can be said is that it might be regarded as satisfactory evidence in favor of Colles's law if the possibility of spermatic infection were established.

Turning to another side of the question, it may be asked, if the presence of a positive maternal Wassermann during pregnancy is to be admitted as evidence of the existence of latent syphilis, what can be said of the 65 women included in Chart II who presented a negative Wassermann during pregnancy,

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but yet gave birth to 43 definitely syphilitic children? I must confess my inability to answer the question, and while numerous suppositions might be advanced, I shall content myself with pointing out that as yet we know too little concerning the significance of the Wassermann reaction to feel justified in making dogmatic or ex cathedra statements.

In addition to these somewhat dubious reflections, I have seen several patients in whom the theoretical possibility of Colles's law was very great. One of them, which was a case of double ovum twins associated with superfecundation, appears to afford presumptive evidence in favor of it. The history is as follows: In 1896 and 1897 the colored patient had her fifth and sixth spontaneous labors in our out-patient department. On September 26, 1898 (out-patient service No. 502), when twenty-seven years of age, she gave birth spontaneously to double ovum premature male twins. The first weighed four and the second four and one-half pounds; the former was raised, while the latter, which was asphyxiated when born, died in three hours. Autopsy (No. 1153) was done and the following anatomic diagnosis was made: "Congenital syphilis, syphilitic cirrhosis and interstitial splenitis; interstitial pneumonia; thickening of epiphyseal lines; ecchymoses of epicardium; patent foramen ovale." Microscopic examination of the two placentæ showed that the first was normal while the second presented typical syphilitic lesions. In other words, one of the double ovum twins was syphilitic and the other normal.

Upon attempting to find an explanation for this unusual occurrence the patient was closely questioned and admitted that she had intercourse both with her husband and a lover, who was found to be under treatment for syphilis in the genito-urinary service. As all of the six children born prior to the twins had been normal, and as the microscopic examination of the placenta from the sixth was negative, we allowed ourselves to make the somewhat phantastic diagnosis of superfecundation, and assumed that the normal twin had been fertilized by the husband and the syphilitic one by the lover.

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The subsequent history confirmed this supposition, for following the twins the patient had eleven other full-term spontaneous labors with live children, the last one being born on May 8, 1912 (out-patient service No. 5527) when the patient was forty-one years old. Microscopic examination showed that all of the placentæ were normal.

As the twins were born years before the discovery of the spirochete and the Wassermann reaction no information along such lines was available at that time. In 1916, however, we looked up the patient and found that she was in good condition and at no time had presented symptoms referable to syphilis. Both she and her husband presented negative Wassermanns, but unfortunately the test could not be made upon the remaining twin as it had died in childhood.

I do not care to be understood as claiming that this case offers irrefutable evidence in favor of Colles's law, but a little reflection must convince the most skeptical that it is highly suggestive. In this instance we have records of the microscopic examination of the placentæ from the labor preceding and from the eleven labors following the supposed superfecundation, and all were normal. Furthermore, all of the other children were born in good condition and were somewhat above the average weight. Consequently it may be safely affirmed that the only evidence of syphilis in the remarkable reproductive career of this patient was in one of the double ovum twins. Furthermore, it may be inferred had the husband been responsible for it that some of the other children would likewise have presented evidences of the disease, but as this was not the case it seems permissible to surmise that the lover was responsible for it, in which event it could only be explained as due to paternal infection and that the mother exemplified Colles's law.

In several other instances histories were encountered which can most readily be explained as resulting from spermatic infection and exemplifying Colles's law.

I shall refer briefly to one such patient (History O. 7279; O. 7766 and O. 8362). In this instance the patient, who

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previously had five spontaneous labors with normal children, gave birth to a premature macerated syphilitic child in 1916. As her Wassermann was negative that of the husband was taken and found to be positive. Neither was treated. In 1917 she gave birth to premature macerated syphilitic twins. Her Wassermann was negative and the husband's positive. Again neither was treated. The following year she returned early in her eighth pregnancy, with a negative Wassermann. That of the husband was again positive. The patient was then treated intensively, with the result that she had a normal child at full term, with a normal placenta. The husband was not treated. The child was discharged in excellent condition 112 grams above its birth weight. Unfortunately, however, neither it nor its parents could be located in March, 1920, when we attempted to learn its ultimate fate.

Of course it must be admitted that such a history does not afford conclusive evidence in favor of paternal infection or of Colles's law, but at the same time it creates a strong presumption in their favor, which to my mind is more convincing than the evidence which is usually relied upon to prove their impossibility.

I shall not attempt to carry the argument further and shall conclude by stating that in my opinion the possibility of spermatic infection and the admissibility of Colles's law has not yet been conclusively proved or disproved, and consequently should be regarded as still *sub judice*.

It is scarcely necessary to add that the collection of the data upon which this paper is based has entailed an enormous amount of routine work on the part of members of the obstetrical staff as well as of several members of the pathological staff. Consequently, I take this opportunity to express my appreciation of the painstaking efforts of a considerable number of persons without whose aid the work could not have been completed.

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DISCUSSION

DR. GEORGE GELLHORN, St. Louis, Missouri.—The investigations of Dr. Williams will serve to settle definitely several mooted questions connected with the problem of syphilis in pregnancy. My own statistics obtained from a much smaller material reflects in all essentials the imposing figures of Dr. Williams. I will, therefore, not take the time to submit them in detail at this time. I merely wish to inquire in regard to two points made by Dr. Williams. The first concerns the occasional birth of a syphilitic child by an apparently healthy (Wassermann negative) mother. As you have just heard, Dr. Williams inclines to the possibility of a gradual immunization of the mother by the continuous casting off of antibodies or chorionic villi into the maternal circulation. But I still prefer to consider Colles' law as incompatible with our conceptions of the pathology of syphilis. I prefer to explain it by such eccentricities of the Wassermann reaction with which Maud Menten made us acquainted about two years ago. As you remember Menten found in a considerable percentage of her cases that a strongly positive Wassermann would turn into a negative one immediately upon delivery, and this happened irrespective of whether the patient had received treatment or not.

The second point is of even greater practical importance. The excellent results of Dr. Williams with energetic treatment during pregnancy should forever quiet the fears of those who object to such treatment because of danger to the child. It may be that some children are born dead in spite of the treatment, but such instances do not mean a real loss to society. On the contrary, they relieve the parents and the community of a serious burden. But there is a much wider outlook to the whole question. We know that our homes for the feeble-minded, our asylums for the blind and deaf, our houses of correction, our jails are peopled with congenital syphilitics. Is it possible to reclaim at least a number of these unfortunate ones for society? A Swedish physician, a Dr. Welander, a man of deep humanity and wide vision, was to my knowledge the first to attack this problem, He founded, in 1900, a home for hereditary syphilitics, and he found that if energetic treatment was instituted early enough and continued for four or five years, a

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very large proportion of his little patients measured up to healthy children, physically, intellectually and norally. Welander's example was emulated in Germany both by private and municipal initiative and here, too, favorable results were observed.

At the Children's Hospital in St. Louis similar efforts have been made for the last four or five years, and Dr. Jeans, who conducts the work, expressed himself very optimistically to me. The one thing all these pediatricians deplore, is the fact that they do not get the children early enough, but if Dr. Williams' plan be systematically carried out by all obstetricians, all babies would get their first treatment *in utero* and before the disease has had much time to make a headway. They would thus get a proper start in life, and the obstetrician by anticipating the work of the pediatrician would benefit not only the individual but the entire race. Let us, then, support by all means the appeal of Dr. Williams for the efficient treatment of syphilis during pregnancy.

Dr. Reuben Peterson, Ann Arbor, Michigan.—When I received notice that Dr. Williams was going to read a paper on this subject, I tried to get some statistics from our clinic, inasmuch as we have been interested for a number of years in this question. Unfortunately I was unable to obtain all the data I desired. However, the data I have collected I thought might be of interest inasmuch as it includes the Wassermanns from a large number of patients admitted to the hospital, besides the patients in the obstetric and gynecologic clinic.

It would seem at first sight it might be difficult to obtain a Wassermann from every patient admitted to a large hospital. We have found no difficulty whatever at the University Hospital. When patients apply for admission a Wassermann is taken in every instance, and this shows some rather interesting findings. The examinations include patients from all departments. There are a number of patients distinctly syphilitic applying to the department of dermatology, but still there are large numbers in the general hospital who show positive Wassermanns. Out of 5965 patients admitted in six months, there were positive Wassermanns in 19.6 per cent. That is a surprisingly large percentage according to my reading.

Turning to the Department of Obstetrics and Gynecology, there were 1348, a comparatively small number as compared

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with Dr. Williams' clinic. It is interesting, however, to check up on Dr. Williams' statistics, as only occasionally do we have a colored patient. Our statistics show that there were 643 Wassermanns taken of the mothers, with 44 positives, or 6.4 per cent.

Turning to the children (this is the obstetrical department of the clinic) we find that in 671 children examined, practically the same number were positive, that is, 6.7 per cent. If I am correct, this is a much larger percentage than Dr. Williams obtained. But in the women applying to the gynecologic clinic, we find that in 1247 examinations there were 114 positive Wassermans. In other words, the women who applied for treatment, for diagnosis, and so on, in this clinic showed a 2 per cent. higher rate than in the obstetrical clinic, which was surprising to us because we thought the ratio in the obstetric clinic would be larger than that in the gynecologic clinic because a large proportion of the children born of these women are illegitimate.

I also have had a record made of every placenta examined microscopically, and I am quite sure, without investigating these cases, the results will bear out what Dr. Williams has stated, that is, that the Wassermann is only a check. It is a stimulating means of investigation, but the real knowledge of whether a woman is syphilitic or not will come better from an examination of the placenta than from the Wassermanns because there are so many factors in the Wassermann examination that make it rather doubtful.

Dr. John O. Polak, Brooklyn, New York.—In our prenatal clinic, largely through the work of my associate Dr. Beck, we have been making Wassermanns in every patient who applies to this clinic. It is interesting to note that a history of syphilis has had little value in our investigations save in the cases where there has been a history of repeated miscarriage, and unless a routine Wassermann is made on every patient who applies to the prenatal clinic, one will skip syphilitics. We tried for a number of years to make Wassermanns on suspected cases and have been surprised to see how few Wassermanns we got, but since we have been making a routine Wassermann of every prenatal case, our statistics are what Dr. Peterson's are, but we are dealing with white women; we have very few colored women,

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and we have about 6 per cent. of positive Wassermanns. Where we have a positive Wassermann we have it repeated, as we have found there is a discrepancy in the Wassermanns unless they are repeated—always twice, sometimes more, and we have only checked up the positive Wassermanns that have come back after two positive examinations.

Another point of considerable interest is this: Immediately on the discovery of a positive Wassermann in pregnant women, no matter at what stage of pregnancy she is, we should give her salvarsan, even if it is a week before labor. It has been brought to our attention that women who have had positive Wassermanns and who have had an injection of salvarsan prior to their delivery give birth to a child which is more likely to survive, for the baby has received prenatal treatment and they are not so likely to succumb to the pneumonias and other conditions in the first week or so after delivery.

One other interesting fact is that in the last year, wherever women have had a positive Wassermann and have received salvarsan, we have had only one stillborn child due to syphilis.

Dr. Harold C. Bailey, New York City.—This subject is so important from the standpoint of the reduction of stillbirths that, it seems to me, we should have a little more data regarding the problem of the child and what will be the future of these children we have saved, and how far shall our advice go with reference to further treatment. We have had three instances in the past month in our Bellevue service, in two of which the diagnosis was made by the microscope with dark field, with apparently normal children, and one woman with a positive Wassermann with a normal child. The question is, how far shall our treatment extend with negative Wassermann in these babies? There will come a time when these Wassermanns will become positive in the infants and they should be treated as syphilitic infants. Shall we inject salvarsan into the longitudinal sinus of the baby, or adopt the mercury inunction method which is seldom followed out?

Dr. J. Whitridge Williams, Baltimore (closing the discussion).—It is very interesting to hear that Dr. Peterson observed a much higher incidence of positive Wassermanns in his white women in Michigan than we have in Baltimore. I cannot

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account for it, except that in a general way it confirms the experience of his colleagues in pathology (Professor Warthin) who found, if I remember correctly, that 40 per cent. of all the autopsies which he performed in Michigan showed signs of syphilis. If he is correct, it would seem that Dr. Peterson's figures are surprisingly small.

In regard to what Dr. Polak has said, I can only endorse his statement that in a larger number of cases we were unable to elicit a definite history of infection, as in our entire series we could obtain a history of a primary sore in only a small number of cases, while a history of secondary or tertiary lesions was lacking in 80 per cent. of the patients. In other words, it is my experience if we were to rely upon the history alone that four-fifths of the patients would escape treatment.

Regarding repeated Wassermanns, I can only say that they are repeatedly made upon our patients, for whenever they present a positive Wassermann they are not treated by us but by the syphilitic department of the hospital. In that service a Wassermann is taken with each dose of salvarsan, so that in the patients who are efficiently treated, we have a large number of controls. After the patient has had six salvarsans, she is given a course of mercurial treatment, and if at its end the Wassermann is still positive, another course of salvarsan is given.

In general, I think that the most important fact derived from our investigations is the very wonderful results which we obtain from efficient prenatal care, and my paper shows that one of the important duties of the prenatal clinic is to detect the existence of syphilis at the very earliest possible period of pregnancy and to treat it energetically. In my experience the difficulty exists not in making the diagnosis, but in persuading the women to return at regular intervals for treatment. As we have developed this work, it has been necessary to increase greatly the number of prenatal workers, so as to educate the women to return regularly. After delivery the cases are followed up to ascertain what happens to the mother and the child, and the amount of work which is required to get ideal results in this respect is appalling.

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EXTRAPERITONEAL CESAREAN SECTION

By John A. McGlinn, M.D.
Philadelphia, Pa.

Having had considerable experience in the past twenty years with the Sänger and Porro-Cesarean section in clean and infected cases, with but two maternal deaths, both moribund eclamptics, it is natural that I should view the claims of the so-called newer operations with a certain degree of skepticism. The operation of extraperitoneal Cesarean section, however, is not new. It is only a revival of an operation which has been advanced and abandoned several times in its century of existence.

Jörg first advanced the operation in 1807 and was followed by Ritgen, who operated on his first case in 1821. The operation was not completed; profuse bleeding compelled him to abandon the attempt and resort to the classical Cesarean section. The child died shortly after birth and the mother died two days later from hemorrhage.

In 1822 Dr. Physick proposed a similar operation, based on anatomic studies, but the operation was never performed. There is a record of a similar operation being attempted in France in 1823, but this also had to be abandoned and the technic changed to the classical operation on account of the difficulties encountered.

We can understand the crying need of such an operation during the period prior to aseptic surgery, when practically every case of the classical operation resulted fatally from infection, and yet the operation was apparently abandoned and we

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heard no more of it until 1870. In that year Dr. T. G. Thomas conceived the idea of extraperitoneal Cesarean section and performed the operation on the cadaver. He afterward performed the operation on a woman dying of pneumonia in an effort to save the child, which, however, died shortly after birth. In 1875 Dr. Skene performed the first successful operation. Other operations followed and Thomas was able to report a series of cases, with four living babies and a maternal mortality of 40 per cent. Nicholson states there were reported fourteen such operations, with a maternal mortality of 50 per cent. and a fetal mortality of 42 per cent. In 1892 Thomas discarded the operation for the classical Cesarean section, with aseptic technic.

With the advent of aseptic surgery the operation was again practically abandoned, though Frank continued at work on the problem. He desired to perfect an operation which would be safer than the classical Cesarean section in the infected cases or in the case that had been in labor a long time. In 1906 he proposed a transperitoneal operation, with the isolation of the general peritoneal cavity by attaching the parietal and visceral peritoneums. Between 1892 and 1906 very little mention of the subject is found in the literature, the supposition being that the operation was discarded in favor of the classical operation, with aseptic technic.

Subsequent to 1906 many Continental surgeons proposed varied technics for the true extraperitoneal operation and some modifications of Frank's transperitoneal method. We find, however, no reference to the subject in British or American literature until Tweedy's paper in 1911 and Nicholson's masterly review in 1914. Although Tweedy's paper was a clarion call to the British surgeons to adopt the operation, I have been unable to find another reference in British literature since that date. There is also a paucity of papers in American literature during the past ten years. The war hardly explains this lack of interest, as the Continental literature is full of references during the same period.

Recently there has been a rewakening of interest in this

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subject, and we hear many discussions of the advantages of the newer operations, which are as old as the operation itself.

Extraperitoneal Cesarean section operations can be divided into two general types:

(a) The true extraperitoneal, in which the peritoneal cavity is not invaded at any stage of the operation. This operation will be referred to in this discussion as the extraperitoneal.

(b) The transperitoneal, in which the peritoneal cavity is opened and subsequently isolated by attaching the parietal and visceral peritoneum and the uterus opened in this artificial extraperitoneal space. This operation will be referred to in this discussion as the transperitoneal.

The advantages of the extraperitoneal operation over the classical Cesarean section were set forth by Tweedy in a paper published in 1911. Speaking of the classical operation he stated: "He (the operator) knows that to obtain good results the operation must be performed before or within a comparatively short time of the onset of labor; that the membranes should not be ruptured; that frequent vaginal examinations introduce an element of danger which may act as a positive contraindication to the operation. Above all, he knows that the wound is liable to imperfect healing. As proof of this, one need only point to the number of deaths that have occurred from rupture of the uterus in subsequent pregnancies; to the device of introducing adhesions between the uterine and abdominal wounds; and finally to the radical procedure of sterilization which ensures against another pregnancy."

Referring to the advantages of the extraperitoneal operation: "If it is true that the newer operation can be performed safely and becomes easier when the woman is far advanced in labor, with the membranes ruptured and the lower uterine segment greatly thinned out; that the incision through which the child is delivered involves such a comparatively unimportant and bloodless part of the uterus that its rupture in a subsequent pregnancy would be a matter of little significance; that for practical purposes the operation is extra-

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peritoneal; that there is no possibility of the formation of adhesions to cause intestinal obstruction or incarceration of the uterus; that because of a preëxisting sepsis suppuration of the uterine wound does not necessarily mean general peritonitis, then surely the operation is worthy of greater consideration than it has yet received from British surgeons."

B. C. Hirst (1913) sums up the advantages as follows:

"1. The mortality of an extraperitoneal section should be the minimum in both clean and infected cases.

2. The uterine wound is in such a position that even if it should leak or become infected the result is not necessarily disastrous.

3. There can be no intraperitoneal adhesions afterward with an abnormally high position of the uterus as the least disagreeable consequence.

4. The convalescence of the patient is much more comfortable in every way.

5. The abdominal wound is stronger, less disfiguring and less likely to exhibit hernia.

6. If the uterine wound should burst in a subsequent pregnancy or labor the accident is not so dangerous as if the wound were intraperitoneal."

He goes on to say: "I am not, however, arguing so much for the adoption of the extraperitoneal section in infected cases as for the deliberate selection as the best of operations in clean cases." He also decries the difficulty of the operation as an argument against its general adoption, yet in the same year he perfected and advocated a transperitoneal operation which has not, as fully, the advantages of the extraperitoneal and which is shorn of the difficulties of the latter.

Dr. Lee states: "Viewed from the most modern viewpoint the classical Cesarean section leaves much to be desired:

"(1) It is not safe when infection is present or only suspected, therefore, that it cannot always be used to obviate craniotomy on the living child; (2) postoperative intestinal complications are frequent, and while seldom fatal are always disturbing; (3) peritoneal adhesions are often left, causing

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suffering and trouble later; (4) the uterine scar may rupture in a subsequent labor; (5) there is still a mortality of 1 to 2 per cent. and higher in just those cases where one would like to adopt this method of delivery."

The disadvantages of the classical Cesarean section may be summarized as follows:

1. In the non-elective case the maternal mortality is higher than in the elective case. The mortality increases with the length of labor prior to operation, the rupture of the membranes, the number of vaginal examinations and the attempts at vaginal delivery. The mortality is dependent upon infection, frequently peritonitis.

2. The frequency of rupture of the uterus in the site of the scar in subsequent pregnancies and labors.

3. The formation of adhesions between the uterine and abdominal wounds.

4. The unsightly abdominal scar and the possibility of incisional hernia.

5. Postoperative intestinal complications.

The advantages of the two types of extraperitoneal operation may be summed up as follows:

1. The peritoneal cavity not being opened or isolated from the field of operation, the danger from infection is less and therefore a better operation in the infected or supposedly infected case.

2. If the uterus ruptures in the site of the incision in subsequent pregnancies or labors it is an accident of no material consequence.

3. There is no danger from the formation of peritoneal adhesions.

4. The scar is not unsightly and the possibility of incisional hernia *nil*.

5. There are no postoperative intestinal complications.

6. Hemorrhage during the operation is slight.

1. In order to debate the first of these disadvantages and advantages it will be necessary to discuss briefly the subject of puerperal infection. It will not be necessary to discuss

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sources of infection other than through the birth canal. It is accepted that infections of the birth canal are implanted from without and increase in frequency with the number of vaginal examinations, the length of labor, the rupture of the membranes and attempts at manipulative or instrumental delivery. Wound infections of the vagina are not germane to the subject. Infections may also be implanted in the uterus and the usual location is in the placental site. When infection gets into the uterus it may travel to the peritoneum through the lymphatics, the Fallopian tubes and in the case of Cesarean section through the uterine incision. It may extend into the pelvic cellular tissue, the body of the uterus, the pelvic veins, causing a thrombophlebitis, or into the blood stream, causing a bacteriemia.

It must be admitted that the Sänger operation does not in any way combat infection in the frankly infected or potentially infected case. Further, it increases the dangers by predisposing to general peritonitis both by the spill of the amniotic fluid and extension of infection through the uterine incision. The Sänger operation followed by hysterectomy and the extraperitoneal treatment of the stump fulfils every need while the infection is still limited to the uterus except for the spill during the operation.

To what extent does the extraperitoneal operation meet the indications to combat infection? Only in two ways—the spill from the uterus is extraperitoneal, and if the uterine incision becomes infected there is less danger of peritonitis, providing the peritoneum has not been torn during operation, an accident which has frequently happened. If infection occurs in the pelvic cellular tissue it is not so serious a matter as if it occurred in the peritoneum. This is true, and yet patients die after pubiotomy from infection in this locality, and, as a matter of fact, statistics show a mortality of 4 or 5 per cent. from infection in the extraperitoneal cases. Some authors lay great stress on the advantage of drainage of the uterus through the uterine fistula by packing the uterine cavity with iodoform gauze and bringing one end out through the

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abdominal incision. Practically what advantage would this have over draining down hill instead of up hill by packing the uterus with gauze and bringing it out through the cervix? We have all learned how futile such treatment is. The extraperitoneal operation does nothing to combat infection if it is lodged in the placental site or has extended beyond it to any degreee whatsoever.

The transperitoneal operation is even less efficient. I do not believe there is a method of attaching the parietal and visceral peritoneum that will absolutely prevent leakage of the spill to the peritoneal cavity. Again, there is always the possibility that the attached peritoneum will be torn apart during the delivery of the child and the peritoneal cavity exposed. This has actually occurred in every case that I have witnessed, the intestines being seen in the upper angle of the incision. I feel sure that with proper technic the peritoneal cavity can be as effectually protected in the Sänger operation as in this operation.

If after delivery of the child the two layers of peritoneum are separated and attached to their position, there is little added protection against the spread of infection through the uterine incision other than that given by an infected peritoneum covering a more or less traumatized area of the uterus, for the peritoneum must be infected by the discharges passing over it and the uterus must be traumatized when its covering is detached.

If the spill from the uterus and infection of the incision were the only dangers to be met in the delayed or handled case, then the extraperitoneal operations would practically solve every difficulty. They have no place in the frankly infected case any more than the Sänger operation has. When we elect the operation in the potentially infected case we are simply gambling on the presence and extent of infection.

Cragin in discussing the relative value of the two operations says: "I believe that the classical operation of Sänger is a better operation in clean cases and that in infected cases the superiority of the extraperitoneal Cesarean section over the

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Sänger incision, followed by hysterectomy after the removal of the child, is still to be proved. Both the maternal and fetal mortality of the Sänger Cesarean section at the Sloane Hospital are lower than those of the extraperitoneal Cesarean section as reported from Germany, hence the author feels justified in preferring the former."

Williams states: "As neither of these operations are available for use in infected patients, are more difficult to perform and do not give better results than the classic Cesarean section, it is questionable whether they will permanently displace it after the novelty attending their employment has disappeared."

2. Sufficient cases of rupture of the uterus at the site of the uterine scar have been reported to make this a vital subject. To say, however, that if the rupture occurs in the lower uterine segment instead of the body of the uterus is an accident of no material consequence is a doubtful statement and one not based on observed facts. The usual site of rupture of the uterus is in the lower uterine segment just where the incision of the uterus is made in the extraperitoneal section. In Lobenstine's 37 cases of uterine rupture the mortality was 73 per cent. In Eversham's 140 cases the mortality was 45.8 per cent. and in Scipiade's 97 cases it was 65.8 per cent. Why should rupture of the uterus in the lower uterine segment after Cesarean section show a smaller mortality than rupture at the same site without Cesarean section, and how in the light of these mortalities can it be regarded as an accident of no material consequence? As a matter of fact, rupture of the uterus is an exceedingly dangerous condition no matter when, where or how it occurs, and no statement not backed by facts can prove it otherwise. It is yet to be proved that rupture of the uterus is less frequent after the transperitoneal operation than after the Sänger. Theoretically it should be more frequent.

3. There is no danger from the formation of peritoneal adhesions. The formation of peritoneal adhesions in the Sänger is an unquestioned disadvantage of the method. This

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disadvantage is entirely eliminated in the extraperitoneal operation and practically entirely so in the transperitoneal.

4. The scar is not unsightly and the possibility of incisional hernia *nil.* This cannot be denied in the extraperitoneal operation when the Pfannenstiel or inguinal transverse incisions are used. When the medium or vertical lateral incision is used there is, of course, no difference between them and the ordinary incision for the Sänger operation.

5. There are no postoperative intestinal complications. There is no question that in the extraperitoneal operations peritoneal insult is avoided and there is no danger of intestinal complications other than might follow a normal labor. In the transperitoneal operation, however, while the danger is less than after the Sänger operation, it is not entirely eliminated.

6. Hemorrhage during the operation is slight. This may be true, and many authors lay stress on this point, but it is not in accord with my observation or experience. Again, many authors controvert this statement, giving hemorrhage as one of the disadvantages of the extraperitoneal operation. The operations which I have seen in this region have been bloody. During the war I had considerable experience with gunshot injuries in the prevesical space and I found bleeding not only profuse but difficult to control. If complete hemostasis is not obtained infection is likely to follow in the deep cellular tissue. I recall one case of infection following injury in this region, with death resulting from peritonitis, when autopsy showed absolutely no injury to the peritoneum.

In the transperitoneal operation, while bleeding may not be more profuse than in a Sänger operation, it is at times certainly more difficult to control. I recall seeing such an operation performed by one of our most skilful obstetric surgeons where the bleeding so obscured the field of operation that it took him ninety minutes to complete the operation while his average time for a Sänger operation is twenty minutes. There is never any difficulty with bleeding in a Sänger or Porro operation, consequently these operations could not be more advantageous in this respect.

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While the extraperitoneal operations have certain admitted points of superiority they also have certain disadvantages.

1. The extraperitoneal operation is unquestionably more

1. The extraperitoneal operation is unquestionably more difficult and time-consuming than the classical Cesarean section. the general adoption of the operation. They maintain that the surgeon should master the technic and should not allow the difficulties of the procedure to prevent him performing an operation so vastly superior to the classical section. Logically, these should all perform the Dührssen-Sohn's operation, which, while the most difficult, is at the same time most truly extraperitoneal. The difficulty of the operation is a disadvantage. Skill can only be acquired on the living subject, and the American surgeon hesitates to acquire skill at the price of the life of his patient. We see all through the history of the operation the tendency toward the simplification of technic, and of late the advocacy of the less scientific but easier transperitoneal operation.

2. On account of the time it takes to perform, it is not applicable in the rare case when speed is necessary to save the child.

3. There is danger of injury to the bladder and urethra. This accident has been referred to frequently in the literature.

4. It is not applicable in cases of placenta previa.

5. It has no place in the frankly infected case.

6. In clean cases, when a positive indication for section exists, it is not possible to repeat the same operation (extraperitoneal) in the majority of cases.

7. Mortality and morbidity of the operation: Latzko collected 150 cases, with a general mortality of 7.3 per cent. and a mortality from infection of 5.4 per cent. In Jeanin's 148 cases the general mortality was 7.45 per cent. while the mortality from infection was 3.04 per cent. In Lewis's 102 cases the maternal mortality was 8.8 per cent. In Latzko's and Jeanin's combined cases the morbidity was 30.7 per cent., of which 25 per cent. was due to infection.

In discussing this operation it is interesting to go back a

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few years and read what standard text-books of obstetrics said of it:

Dorland, in 1901, makes no mention of it.

Webster, in 1903, said, "it should have no place in obstetric surgery at the present time."

Norris, in 1903, gives nine lines to the subject. "The necessity for laparo-elytrotomy can scarcely be said to exist."

Hirst, in 1899, speaks of laparo-elytrotomy as an operation that is no longer justifiable.

What is the status of the operation at the present time?

Theoretically, in clean cases the extraperitoneal operation is the ideal operation, but its disadvantages overshadow its advantages. The transperitoneal operation is superior to the classical Cesarean section for the reason that the resulting adhesions are in a situation less likely to give trouble. The Beck operation is superior to the transperitoneal operation, as it has all the advantages of the former and none of its difficulties.

In the frankly infected cases the operations are contraindicated.

In the suspected cases the operations have a place. It is to be remembered that they only protect the peritoneum against infection from the spill of the amniotic fluid and extension of infection through the uterine incision. When they are selected, instead of the Sänger incision followed by hysterectomy we are simply gambling with the extent and distribution of the infection. It must also be remembered in this connection that all cases of peritonitis following Cesarean section are not uterine in origin.

My own feeling is that the Beck operation, with thorough protection of the peritoneal cavity and perfect peritonealization of the uterine incision, is superior to the transperitoneal operation as a routine procedure. While theoretically it is not as efficient as the extraperitoneal method, practically on account of the many disadvantages of the latter, it is the better operation.

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In conclusion: The operation is over a century old. The same discussions that we are hearing now were heard in 1807, in 1827, in 1870, in 1906 and in 1913. There has hardly been a new thought advanced, pro or con, except variations in technic. The operation has never been generally accepted, and it never will be. While it has many advantages, they are overshadowed by its disadvantages.

It is a laudable object to perfect technic to reduce mortality, but our real problem is to so raise the standard of obstetric knowledge and practice as to make the operation unnecessary.

DISCUSSION

DR. JOHN O. POLAK, Brooklyn, New York.—After the arraignment Dr. McGlinn has made of extraperitoneal procedures, I have some hesitancy in talking.

I have had no experience with the true extraperitoneal operation. The last one performed in our clinic was done by the late Dr. Skene, and the last one I saw performed was about a year ago when it was revived at the Lying-in Hospital. When I saw Dr. Skene do the operation it impressed me as a bloody procedure done out of sight, and had none of the advantages that a surgical procedure should have.

We have done a very large number of classical Cesarean sections, and we feel that there are some objections to it. We have reopened 17 of these classical cases. We have studied the scars in these 17 cases; we have found adhesions of the intestines to the scar in 5; we have found weakened scars in 12 covered by omental attachments. For this reason, and on account of the morbidity we were getting, we analyzed our cases and at the suggestion of Dr. Beck we have done a modification of the Kronig operation. We believe that infection does not come from the spill; we believe any surgeon can protect the abdomen from the spill in the classical operation. We furthermore believe that infection comes from the endometrium and in our autopsy observations after the classical operation, where the patients have died of peritonitis, we found one picture,

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and that was along our suture line. We had the same picture that presents itself when we have suppuration of the abdominal wound around silkworm-gut suture. The infection came from the endometrium which is admitted to be the most frequent site of infection of the uterus. It is the carrying in of the flora from the vagina into the uterus that gives rise to the endometritis and the suture carries it through to the peritoneum. After doing a number of Kronig operations, I tried the Veit-Fromme-Hirst operation, but found we did not protect the peritoneum, so we are now doing Beck's modification of the Kronig. We have the scar low down under the bladder reflection, and as a result these patients do not have adhesions. Convalescence is smoother.

Another point of great interest is that we have done this operation in the frankly infected cases. We have no instance of dystocia in cases where we have resorted to this procedure. In an experience of 260 classic operations we have only had to do 2 Porro operations. I do not believe the universal principle that has been taught, that in each case of infection a Porro operation is the only thing, can be confirmed in our experience. The principal point to my mind of the transperitoneal operation is that those patients who are suspected of being infected can have their uteri saved.

In regard to rupture, all of us have done anterior vaginal hysterotomy; all of us have effected subsequent deliveries through the scar. What is the difference between a low operation and the vaginal procedure? Rupture through the scar in this location is not a serious matter, as the rupture is under the bladder reflection. We have seen them dilate; some of them rupture. We have never seen a fatality in these cases and we did a large number at one time.

DR. JOSEPH B. DE LEE, Chicago.—I am very much interested in these newer forms of Cesarean section. I have given up true extraperitoneal section, that is, where the peritoneum is preserved and no opening made into the peritoneal cavity. I have noticed, too, in reading the later European literature that over there the extraperitoneal Cesarean operation is being displaced by the low cervical Cesarean, and the high or corporeal, or old classic, Saenger, or as it should be called the Saenger-corporeal or fundal-Cesarean section is discarded to the benefit of the low cervical. I claim the low cervical Cesarean section has distinct

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advantages over the classical, and I perform it in nearly every case except for certain conditions. These conditions are getting fewer.

I would like to ask Dr. McGlinn if in the course of his study of the literature he has found a single case of rupture of the uterus after cervical Cesarean section? Considering the thousands of operations that have been done already, we ought to have some cases of rupture of the uterus. I have come across 3 cases of rupture of the uterus. Two reported by Küstner, and the rupture was in a portion of the incision which had extended into the fundus. The other of the three was where a woman who had had a Cesarean section went into labor and burst the uterus not at the site of the incision, but at the side. I would be glad if I could get some authentic cases of rupture of the uterus.

I have done 50 vaginal Cesarean sections where the cut lies in the same location, and I have not yet had a case return to me or a report of rupture of the cervical scar.

Dr. McGlinn made the statement that the operation cannot be done in placenta previa. I used to think so too. I discovered a placenta previa in a case the other day in which I resorted to cervical section. There was less hemorrhage in this case than in some cases where there is no placenta previa.

Lichtenstein in 1919 reported on low cervical Cesarean section, and in 4 of his cases the placenta was attached to the anterior wall. All recovered. We have had 50 Cesarean sections of the low cervical variety and no deaths except in 1 case, and I feel I should have done a craniotomy in that case. The woman was in labor four days; she had a blood-pressure of 208, with albumin and casts in the urine. Her urine was smoky. She had intertrigo all over the belly. The head could not engage. She weighed 278 pounds. As I have said, I should have done a craniotomy in this case. This woman died of peritonitis. I expected too much from the operation. All the other cases made fine recoveries. Two had suppuration.

Dr. McGlinn said that this operation will never generally be adopted. This is probably true of the extraperitoneal method. Our German confrères are performing this operation in cases that are frankly infected. In 500 cases reported by 4 operators, the mortality was 2.05 per cent. The absence of adhesions in these cases is remarkable. It has been stated that the operation

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cannot be done on the same patient twice. That is not true. I have done it on two patients twice. Litchenstein has done it three times on a number of patients. In my 2 cases the peritoneum hardly showed the scar.

I wish to suggest a little improvement in the technic. If you make a careful dissection of the peritoneum downward off the anterior wall of the uterus where it reflects on the bladder, if before you cut into the uterus you move the tissues a little you will see a distinct layer of fascia. You can slit the fascia down individually or you can make a cut into the uterus, cutting the fascia at the same time as you do the muscle of the cervix. When you come to sew it up you do it in the same anatomical manner. In the last 3 or 4 cases I made a separate line of sutures in the fascia, so that there were two rows of sutures in the cervix, one row in the fascia, and a flap of peritoneum, which is a great protection against leakage from the uterus, and gives the firmest possible uterine scar.

DR. EDWARD P. DAVIS, Philadelphia.—One of the worst cases I have ever seen was a Cesarean section done by myself on a woman upon whom previously this kind of extraperitoneal operation had been done by a skillful surgeon. The adhesions were the worst I have ever seen in any abdomen. I would, therefore, question the statement made that adhesions cannot form after the operation. Extraperitoneal Cesarean section is evidently a practical impossibility, but it is a curious thing that a few months ago the old Thomas elytrotomy was actually in process of revival and was being done in this country, so that there is a great tendency to seek some method of extraperitoneal operation. It should only be done in very difficult cases, and then it cannot be depended on.

Much has been said concerning infection. How can you deliver a woman who has been long in labor and dangerously and possibly fatally infected? If you attempt to make bacterial culture, must you judge by the appearance of the decidua or the odor? I can only say that in a considerable number of cases of suspected women in doing the classic section the uterus has been drained by packing carried through the vagina. Ergot and strychnin have been given hypodermically to induce firm uterine contractions. These women have had sapremia, have lived, and maintained the function of reproduction. While that is a

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gamble, are not many surgical operations in some sense a gamble? In the frankly infected cases I think the majority of us are agreed that safety lies in one direction, if infection can be admitted to be present, namely, we should resort to section with the amputation of the uterus and leaving the stump outside of the peritoneal cavity.

I should be glad to see any practical demonstration of the value of the transperitoneal section, but I believe extraperitoneal section has proved a practical impossibility.

Dr. Rudolph W. Holmes, Chicago.—My whole experience has been negative in the employment of the newer methods of Cesarean section. I may be erroneously satisfied with my own work, but I feel that the dangers do not rise or fall by any particular method or technic of operation, but are directly due to the conditions present before, during and after operation. I have always eventrated the uterus, packing off the bowel, and closing the abdominal wound behind the uterus by means of a pack; now, I have a considerable series without any mortality. Essentially, the plan I now follow was instituted about fifteen years ago; in the years previous I had three fatalities in the first ten sections. I have never performed a section on the pelvic indication before labor excepting it be a repeater, or there was an absolute indication, unless there had been a thorough test of labor. My experience convinces me that the mere length, prolongation, of labor places no jeopardy upon the mother or baby, provided her vital forces have not been sapped as is evidenced by a rapid pulse, elevation of temperature, or the facies of exhaustion, nor upon the child provided the heart tones have not radically altered in character. A truly tired woman is not a safe risk for any operation.

I have done Cesareans when the membranes have been ruptured many hours, even in one in which they ruptured nearly three days before without any unhappy reaction during the postoperative period. In fact, I am convinced that a true test of labor is not given the woman unless the membranes have ruptured. It should be an obstetric aphorism that an obstetrician should determine the possibility of the necessity for a Cesarean section as a mental reservation the last days of pregnancy. If this is done, she being held as a specially preferred risk, if no vaginal examinations are made, and if control of labor is obtained

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by rectal touch and abdominal palpation (and the stethoscope), matters may continue into the second stage, after the membranes have ruptured, without jeopardy to the mother or child. Further, it will be surprising how frequently it will follow that such women will have spontaneous labors, or at most a forceps operation of expediency. Labor in women with minor pelvic contraction, with some evident slight pelvo-fetal disproportion, so conducted will only exhibit a small minority who require Cesarean.

The whole sum and substance of this problem is not to stir up the bacterial content of the vagina by vaginal examinations. If infection be suspected, the peritoneum can better dispose of the potential infection than the cellular tissue. Opening up cellular spaces by the newer methods, I believe, endangers the woman more than it prevents trouble, and needlessly complicates the technic. The next two or three years will prove whether these newer, or better rejuvenation of old methods, are not signs of our progress in the fads and fancies of obstetric practice. All the available statistics prove that Cesarean sections are followed by vulnerable scars in the proportion of 16 per cent. The menace of their rupture is a serious problem for him who attempts to conduct a later labor by spontaneous effort on the part of the mother.

The second serious problem is the inevitable liability or probability of adhesions which may cause subsequent distresses; fortunately, in all my sections, so far as I know, I had no such distresses, though in the repeated sections adhesions were found in all with one exception.

DR. JOHN A. MCGLINN, Philadelphia (closing the discussion). —I am rather free to confess that had I looked up the literature on extraperitoneal Cesarean section before writing my paper, I would not have written it. However, after listening to private conversations and discussions in reference to extraeritoneal Cesarean section, and such absurd claims having been made for this operation, it led me to write the paper.

I have great sympathy for Dr. De Lee because he did not have time to finish the reading of his paper, and consequently the points which he intended to bring out he was unable to on account of lack of time. I have lost my sympathy for him now because while I hurried through my paper, I am afraid he did

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not listen attentively to what I was reading. I tried to make a specific differentiation in my paper between extraperitoneal Cesarean section and the transperitoneal Cesarean section, and I still say that in civil surgery of accidents exptraperitoneal Cesarean section, with its difficulties, will never be accepted. Transperitoneal Cesarean section, or the modification as proposed by Dr. Beck, I do believe will meet with general acceptance because incision through the body of the uterus certainly has disadvantages that incision through the lower uterine segment does not have.

I am not aware of any cases of rupture of the utĕrus below the uterine scar. There have been a number of references made to such a thing, but the literature has not been available to us at the present time or before the writing of my paper.

Dr. De Lee cited the rarity of rupture after vaginal Cesarean section. In the vaginal Cesarean sections which I have seen performed, if you incise the uterus in exactly the same place where you incise after transperitoneal Cesarean section, then I have never seen a properly performed vaginal Cesarean section, or a proper transperitoneal Cesarean section, because in the vaginal Cesarean section you go through the cervix, deflect the bladder up but do not open up the peritoneal cavity, whereas in the transperitoneal Cesarean section you make the incision close to the scar which has been referred to in the literature as quite likely to occur. Undoubtedly there are some cases of rupture of the uterus occurring, although I have not been able to find them.

As far as placenta previa is concerned, the operation has been repeated several times in cases of placenta previa.

In reference to the impossibility of performing the operation, I did not say it should not be performed at all, but it should be done under positive indications. In the majority of cases it cannot be performed, and that holds true with reference to extraperitoneal Cesarean section, and not to transperitoneal Cesarean section at all.

I believe as far as the value of the transperitoneal section in the frankly infected cases is concerned, the only protection we have is in the proper peritonealization of the wound. You can do the Beck operation and avoid the difficulties of adhesions, intestinal complications, and it fulfills the place of the transperitoneal Cesarean section because any surgeon can wall off

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the peritoneal cavity as effectively as with transperitoneal Cesarean section. The operation meets every indication the same as the transperitoneal Cesarean section, it is easier to perform, and one that is absolutely shorn of difficulties. The Beck operation has a place in obstetrics at the present time. It is a great advance over the old Saenger operation with the incision made in the body of the uterus.

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STERILITY IN THE FEMALE: A REPORT OF OPERATIVE CURES

By Charles G. Child, Jr., M.D.
New York City

It is not possible for me to present in this paper anything like a complete list of cases operated upon for sterility, nor is it my desire to enter into an extensive consideration of the possibility of relieving female sterility by surgical means. It is only by a report of cases cured at operation that I hope to combat the growing pessimism of the profession on this subject, as reflected in the recent obstetrical and gynecological literature.

Though small in number, these cases have been carefully studied and followed up, and serve fairly well as illustrative examples of what it is possible to accomplish in the surgical relief of sterility.

I am well aware of the fact that many unsuccessful operations for sterility have been performed in the past, and many will, in all probability, be performed in the future. This must of necessity be so in this as in other branches of surgery, but as the subject is more carefully studied results will improve. Only too often is the fertility of the male taken for granted, and, as a result, many women are operated upon unnecessarily and unjustifiably. I am glad to say, however, that I believe few gynecologists of today would think of subjecting a woman to any surgical procedure aimed at the cure of a condition for which she was not to blame, but there is still, I am sorry to say, a tendency on the part of many general

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practitioners to recommend a little "stretching and scraping" to every disappointed bride who consults them. Many of these take such a deep interest in the case as to actually perform the operation themselves. Much of the surgery of the past aimed at the cure of sterility has been of this "family doctor" type, and with the expenditure of very little real thought or study. The reproductive function is of paramount importance to the race and the question of sterility is deserving of most faithful study. Every case of absolute sterility cured by operative measures, and they can be cured in no other way, is a triumph for surgery and should be duly recorded. When the end-result is the birth of a living child, and the fruit of the surgeon's work carried on, perhaps, to generations yet unborn, then indeed is the victory great. Surely it would be dffiicult for any other department of surgery to confer a greater reward on the operator or to show results of greater value to society.

With a constantly increasing rate of sterility among our native-born every childless marriage is deserving of most careful study. I wish that it were possible for me to place before you in this paper a complete record, with end-results, of every case I have operated upon for sterility or in which I have, when operating for other conditions, endeavored to relieve coexistent sterility. This is impossible, however, for it is only within comparatively recent times that our hospitals in New York have instituted anything like adequate follow-up systems, and many of my early ward cases have been lost sight of. With a constantly shifting population it is difficult to even keep track of private cases, and I am forced, therefore, to limit myself to a few cases of which my records are complete. I do this with a realizing sense, however, that somewhere, in some bureau of vital statistics, there are successful cases recorded that I am unable to put down here.

In order to treat intelligently any given case of sterility it is necessary to decide within as narrow limits as possible the cause or causes of the sterility. Many times this offers such difficulty that only an approximation can be reached, and that

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only by a process of elimination. But the more carefully these cases are studied the less frequent becomes the necessity of depending upon a diagnosis by elimination. Possibilities yield to probabilities, and as our skill in observation and deduction increases the etiologic factor will often be found with quickness and certainty.

CASE I.—Mrs. D. R., operated upon April 10, 1903. This patient was thirty-two years of age, with a sterile married life of eight years. She acquired at the outset of her married life an attack of acute pelvic peritonitis, and suffered during several years from frequent subacute exacerbations. The examination showed a rather small uterus, anterior in position, with marked restriction in mobility. The right adnexa were enlarged and adherent, and the left enlarged, adherent and prolapsed. Both sides were tender on examination. Ever since her first attack she had suffered from menorrhagia, dysmenorrhea, backaches, pelvic pain and increasing nervousness. At operation the pelvic condition was approached through an anterior vaginal incision, but on opening the peritoneal cavity the condition was found to be too extensive to handle by this route. The abdomen was therefore opened, revealing the following conditions: Both ovaries were small and buried with the tubes in extensive velamentous adhesions to the broad ligaments, rectum and posterior face of the uterus. These were freed and the ovaries and tubes released. The tubal ends were closed, showing a typical clubbed formation. The lumen of the left tube was so completely occluded, and the ovary so destroyed in freeing it from adhesions, that these were removed. The right tube was opened and probed, and a plastic reconstruction of the fimbriated end carried out. The subsequent convalescence was uneventful. A marked improvement in all symptoms resulted and the menstruation became regular and painless. Eighteen months after operation she gave birth by a normal delivery at term to an eight-pound baby, and eighteen months later a daughter was born at term. Both children are living.

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In this case the picture presented at operation was typical of the ravages of gonorrhea when once the infection gains access to the pelvic organs. The woman was absolutely sterile. Complete embedding of the ovaries prevented the liberation of ova which, even had escape been possible, could not have been taken up by the tubes in their occluded condition. Yet observe the lightning rapidity of result when the path to the uterus had been cleared of obstruction. Eight years' sterility, operation, successful delivery within eighteen months.

CASE II.—Mrs. C. P., operated upon May 14, 1910. This patient was twenty-two years old, had been married three years and had always suffered from severe dysmenorrhea, backaches and continuous pelvic pain and sterility. Examination showed a uterus of extreme anteflexion, with no demonstrable involvement of the adnexa. At operation, through a transverse abdominal incision, the tubes were found to be normal but both ovaries were cystic, enlarged and with greatly thickened cortex. A careful inspection of both ovaries failed to reveal any scars that would denote previous rupture of a Graafian follicle; it was therefore concluded that this was a case of sterility caused by the inability of the Graafian follicles to rupture through the thickened cortex of the ovary and discharge their ova. Both ovaries were resected and cortical stripping done on the right one. The convalescence was uneventful, and during the following year she gave birth at term to her first child. Three years later a second child was born at term, and when last heard from, on July 13, 1914, both children were living and she was pregnant for the third time.

Here a long period of chronic oöphoritis had so thickened the ovarian cortex as to prevent the free rupture of the Graafian follicles and liberation of the ova. This was clearly indicated by the entire absence of rupture scars on the surface of either ovary.

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CASE III.—Mrs. A. C., operated upon September 17, 1910. This patient was nineteen years of age and had been married three years and a half. In 1908 she had a miscarriage at six months, followed by a prolonged convalescence, with elevation of temperature and pulse. Recovering from this she was left with continuous pelvic and abdominal pain. On examination the uterus was anteflexed and showed marked restriction in mobility. No disease of the right adnexa could be demonstrated, but the left were enlarged, prolapsed, adherent and tender. At operation, through a transverse abdominal incision, the appendages of both sides were found prolapsed and adherent, the tubes being closed at their distal end by adhesions. The ovaries were likewise slightly adherent, though otherwise normal in appearance. Both tubes were opened, and the adherent ovaries freed. Convalescence was uneventful. On August 28, 1911, she was delivered at seven and a half months of a living child.

The infection responsible for the tubal occlusion in this patient was not gonorrheal as in Case I, the tubes themselves appearing normal, with the single exception of their fimbriated ends. These were closed by adhesion to the pelvic peritoneum to which, in all probability, they had become agglutinated during the attack of pelvic peritonitis accompanying the puerperal infection. After the fimbriæ were released the tubes appeared quite normal and resection or reconstruction was necessary.

CASE IV.—Mrs. E. T., operated upon October 15, 1910. This patient was twenty-four years of age and had been married nine years. In June, 1903, she was delivered at term of her only child. There had never been any other pregnancy. She complained of sterility, backaches and occasional pelvic pain. The examination showed a uterus normal in size and position, but restricted in mobility. The appendages of both sides were enlarged, prolapsed, adherent and tender. At operation, through a transverse abdominal incision, the adnexa

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of both sides were found prolapsed and adherent. The ovaries appeared normal, but both tubes were closed. The occluded ends were opened and the tubes probed to the uterine cavity. The convalescence was uneventful and she was delivered at term, ten months after operation, of a living child.

The nature of the infection in this case could not be determined. She gave no history of a previous gonorrhea and could not recall any details that would indicate an infection in her puerperium. In all probability the infection in this case was of similar character to Case III.

Case V.—Mrs. L. K., operated upon August 10, 1916. In this case the patient was thirty-three years of age and had been married two and a half years. She had never been pregnant, and complained of continuous pain in the left lower abdominal quadrant, following a sudden attack, with nausea and vomiting one year previous. The examination showed an anteflexed uterus, tender on palpation and slightly restricted in mobility. No enlargement of the adnexa could be made out, but there was marked tenderness on both sides. At operation, through an abdominal incision, it was found that both adnexa were adherent to the broad ligament and omentum. The tubes were closed, presenting a typical clubbed appearance. The left was a large hydrosalpinx, densely adherent to a cystic ovary. These adnexa were removed. The right ovary appeared normal when separated from the adhesions to the broad ligament and tube. The tube was opened and probed to the uterine cavity. Convalescence was uneventful; she became pregnant three months after operation and was delivered at term of a living child.

Gonorrhea was undoubtedly the infective agent in this case, as indicated by the typical clubbed tubes and the large hydrosalpinx on the left side.

Case VI.—Mrs. L. V., operated upon October 27, 1916, at City Hospital. Patient was twenty-seven years of age.

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Married eight years, had given birth by normal labors to four children, the last in 1912. One miscarriage at five months in 1909. Chief complaints, menorrhagia, dysmenorrhea and pelvic pain. On examination the uterus was found normal in size and position, but with marked restriction in mobility. Both adnexa were slightly enlarged and tender. At operation, through a transverse abdominal incision, the appendages of both sides were found adherent to the broad ligaments and uterus. The ovaries, when separated from the adhesions, appeared normal, but both tubes were occluded at their distal ends. These were opened and the right probed free to the uterine cavity. The left showed an obliteration of its lumen in the middle third, through which it was impossible to pass the probe. The tube was opened at this point and the obliterated portion, about half an inch in length, removed. An anastomosis of the tube had become secure. Convalescence was uneventful. Three years later, on September 23, 1919, she was delivered spontaneously of a living child.

Here we had to deal with the results of a postabortive infection, presumably lymphatic, as in Cases III and IV, although the obliteration of the lumen of the left tube in its middle third might indicate a previous active inflammatory process at this point. Whether conception resulted by means of this anastomosed tube could not, of course, be determined. I have never been able to trace a cure of sterility to this operation, although there have been several reported in the literature.

CASE VII.—Mrs. J. F. G., operated upon in the Polyclinic Hospital September 17, 1917. This patient was twenty-five years of age, had been married for two years and never pregnant. She complained of occasional pelvic pain, backaches and periods of mental depression because of her sterility. Examination showed a small retroverted uterus, with no demonstrable lesion of the appendages. At operation the anterior vaginal wall was lengthened and the abdomen opened. Both ovaries showed marked cystic enlargement, with thicken-

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ing of the cortex. These, on close inspection, showed no evidence of a previous Graafian follicle rupture, the entire surface of both ovaries being smooth, glass-like in appearance and entirely innocent of any scar that would denote follicle rupture. Both ovaries were resected with cortical stripping of the right, the uterus replaced and the round ligaments shortened. Convalescence was uneventful; she became pregnant three months later and was delivered at term, on September 14, of a living child.

Similar to Case II, only with retroflexion instead of anteflexion.

Case VIII.—Mrs. P. R., operated upon May 31, 1918, at the Polyclinic Hospital; thirty-two years of age; this patient had been married four years without ever having been pregnant. She complained of backaches, dysmenorrhea, pelvic pain and sterility. On examination the uterus was found in extreme retroflexion and only slightly mobile. The adnexa were negative. At operation a transverse abdominal incision was made and both tubes were found enlarged, clubbed, prolapsed with the ovaries and adherent. The uterus was retroflexed, adherent and contained a fibroid at the fundus two inches in diameter, with two smaller subperitoneal fibroids. The left tube was removed, the right tube opened and probed to the uterine cavity. The uterus was freed from adhesions, replaced and the round ligaments shortened. Convalescence was uneventful, and on March 18, 1920, the patient was delivered of a living child at term.

In this case the pelvic organs presented a picture typical of a previous attack of gonorrhea. As both tubes were occluded the retroflexion and fibroids could not be considered as a cause of the sterility.

Case IX.—Mrs. C. B., operated upon November 21, 1918, at the New York Nursery and Child's Hospital. This patient

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was twenty-eight years of age and married three years. Six months after marriage she had a two months' pregnancy interrupted, and had suffered from menorrhagia, dysmenorrhea and pelvic pain since that time. Her last menstruation had occurred ten weeks before, and there had been almost daily spotting since that time. Examination showed the uterus anterior in position, slightly enlarged, tender on palpation, and with marked restriction in mobility. Both tubes were tender and the right markedly enlarged. She had been curetted on a diagnosis of incomplete abortion six weeks before. A diagnosis of unruptured right tubal pregnancy was made. At operation, through a transverse abdominal incision, a large unruptured right tubal pregnancy was removed, together with a congested, adherent appendix. Inspection of the left adnexa showed a prolapsed, adherent, closed tube. Both ovaries were normal. The tube was freed, opened and probed to the uterine cavity. Convalescence uneventful. She subsequently became pregnant and was delivered on October 23, 1919, at term by normal labor, of a living child.

The nature of the infection in this case was uncertain. As only one tube was occluded it is more than probable, however, that it resulted from the induced abortion shortly after marriage. Although the patient was pregnant at the time of operation I have included her in this series, because, with the removal of the right tube in the presence of the occluded left, she became a case of absolute sterility and would have so remained had the occlusion not been relieved. Here is a good illustration of the importance of always examining the opposite adnexa when operating on tubal pregnancy, not only because of the possibility of the existence of a bilateral tubal pregnancy, but because the remaining tube may be occluded and the woman left hopelessly sterile unless it is relieved.

CASE X.—Mrs. D. M. O., operated upon in the Woman's Hospital, March 3, 1908. This patient was forty years old and had been married three years without ever having been

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pregnant. Her menstruation had begun at fourteen years of age and had always been regular, lasting seven days. Ever since her marriage, and for a number of years before, she had complained of constant pelvic pain, backaches and dysmenorrhea, for which she had been treated locally at different times. An examination showed a small retroverted, adherent uterus, with enlarged, prolapsed, adherent and tender appendages on the left side. At operation, through a transverse abdominal incision, both ovaries were found low down and adherent. The uterus lay in extreme retroversion and was also adherent. The tubes were short and situated high up on the broad ligament. Both ovaries were freed from adhesions and the left, showing marked cystic enlargement, was resected. The uterus was likewise freed from adhesions and the round and the uterosacral ligaments shortened. Convalescence was uneventful. Conception promptly took place and the patient was delivered at term of a living child on May 2, 1909.

In this case there are several points of more than passing interest. The condition of adherent retroflexion is commonly associated with a low degree of fertility, and when the ovaries are covered with adhesions in addition, absolute sterility is the rule. At her advanced age of forty years there seemed very slight hope of relieving the sterility. Yet witness the brilliant result obtained less than fourteen months later. A most encouraging example of the promptness with which nature will act when given the proper assistance.

Case XI.—Mrs. J. H. F., operated upon in the Woman's Hospital on October 26, 1914. She was thirty-six years of age, had been married for one year without ever having conceived. Menstruation began at fourteen years of age, was always regular, lasting eight days and very profuse. Slight dysmenorrhea had developed during the year of married life, otherwise she was free of symptoms other than the sterility. Examination showed a somewhat enlarged retroflexed uterus. The enlargement was irregular in character, indicative of the

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presence of small fibroids. At operation, through a transverse abdominal incision, four of these, the largest two inches in diameter, were removed from various parts of the anterior and posterior uterine walls. A larger intrauterine fibroid was removed from the uterine cavity through an incision made in the anterior uterine wall. Adhesions between the uterus, adnexa and rectum were separated, the uterus replaced and the round ligaments shortened. Conception promptly occurred and she was confined at term on September 14, 1915, by a breech delivery of a living child. The labor, though her pains were strong, was a protracted one, lasting twenty-one hours. The child weighed six pounds one and one-half ounces. Her second confinement occurred in November, 1917. Normal eleven-hour labor, eight-pound baby. Third confinement May 15, 1919. Normal five-hour labor, living child weighing eight pounds fourteen ounces.

Multiple fibroids of the uterus are attended with a low degree of fertility, but it is not unusual for their removal, even as late as the age of thirty-six, to result in a cure of the sterility. This patient's subsequent obstetric history is a particularly gratifying triumph for enucleation. Only too often in these cases is the woman deprived of all hope of maternity by a hysterectomy, or radium or x-ray treatment. Had this patient been so treated the world would have been a very dark place indeed for her and three healthy children would never have seen the light of day. Her first confinement, a protracted breech delivery, with strong labor pains for twenty-one hours within less than one year after operation, shows how firmly the incision in the uterine wall, through which the fibroid in the uterine cavity was removed, had healed. The maintenance of the normal position of the uterus after three puerperiums is a particularly gratifying tribute to the operation of ligament shortening by which the retrodisplacement was corrected.

SUMMARY. In this series of cases the average period of sterility was three and a half years. One case of seven years'

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duration was cured in ten months. The average time from operation to the birth of the first child was 15.3 months while seven patients gave birth within one year after operation.

Seven of these patients were unconditionally sterile due to tubal occlusion, and these subsequently bore eight children—quite a respectable-sized family—that owe their appearance in the world absolutely to conservative surgery. These eleven women operated upon have, to date, borne sixteen living children, and eight are still in the child-bearing period.

Such results as have been obtained in these cases should go far toward creating in the surgeon added respect for the art he practises, and a firmer belief in the value of conservative gynecology.

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ARTIFICIAL IMPREGNATION: ESSAYS IN TUBAL INSEMINATION

By Robert L. Dickinson, M.D.
New York City

The only unimpugnable evidence of effectiveness in instrumental insemination comes from our successful and scientific brother the veterinarian. Human tests are blocked by aversions, vitiated by reticences and happy results are not susceptible of rigid scientific proof without prescription of that ceinture applied to their ladies by certain knights departing for the Crusades, as shown in the glass-cases of the Musée de Cluny at Paris. The plausibility of our claims must rest on publication of histories and methods in some detail, yet this is one of the clinical series in which no one observer is able to present a large group of cases. The records will follow. Here the technic is reported on, with a summary of results.

Marriage may be called an experiment in procreation lacking preliminary tests for fitness or instruction in method. In view of these conditions it should be considered satisfactory that successes run between 80 and 90 per cent. Such averages are scant comfort to the one couple in seven or thereabouts that applies to us. Here we are confining ourselves to the particular pair which has been informed by the doctor that little or nothing is wrong or that an operation will put things mechanically right. Such people are entitled to every measure of reasonable promise before resorting to operation. Suppose this insemination does hold out a reasonable promise. Then in time to come the accredited procedure before turning to operation will be this. Man and wife are each brought up to good physi-

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cal condition and their sex-life studied and regulated. These measures failing, trial is made of a course of artificial impregnation. (Hymen obstruction or vaginal deformity would have called for mechanical correction, but under adequate supervision conception and safe passage through miscarriage dangers are compatible with anteflexion and mobile retroversion.) The instrumental instillation failing, operation may be done for well-marked anteflexion or retroversio-flexion, particularly in the presence of real pain or disability. Laparotomy on the single indication of sealed tubes to be opened or deployed is generally frowned upon because of a common agreement in the reports of scant success. Laparotomy to study and incise the ovaries where it is supposed ova need freeing has an advocate in Reynolds. Laparotomy after six months of marriage just to find out what can be the matter with a woman who appears to be sound has been urged only from Dublin. Whatever the program that appeals to any student of the question there will hardly be denial that better knowledge is needed concerning what constitutes normal sex-life, concerning the male secretion, and genital incompatibilities and these physiologic deficiencies. Nor can some or all of the following considerations be passed by in any particular problem under review.

PRELIMINARIES. Verification of the male secretion will one day be the routine first step. Two or three microsopic examinations are needed. Semen does not run true to form. It is a gauge very sensitive to changes in general physical condition and may present quick and sweeping alterations without apparent adequate reason. Activity of spermatozoa is of major importance, but survival hours are all-important too. Stated in the baldest terms, the two requisites are that in the fresh warm specimen seen in the deep-covered slide speedy transits across several fields should be under way, and, furthermore, at room temperature, activity should persist for hours. One may see the trapped tail, the feeble stroke, short-lived action or even azoöspermia yield to a vacation or reduction of obesity, and such betterment, combined with cure of the commonest sterility lesion in women, endotrachelitis, sufficient to start a family.

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Coitus is to be regulated. Prolonged intervals may produce as poor specimens as undue frequency. An individual has a normal cycle which will deliver the best result, and this might be worked out, but seven to ten days is a fair average for the liveliest persistence in my few studies of multiple specimens.

On the part of the woman correction of flabby or rapid obesity counts, as do general condition, good periods and sex responsiveness.

Leucorrhea of an acid or purulent character is to be arrested, and this goes hand in hand with its main reason, unhealthy states of the lining of the cervix. The spectacular cures are those in which healing of the raw surface or drainage of the clogged canal is instantly followed by conception.

The mild alkaline douche an hour or so before coitus is in use for acid vaginal secretions and will be used even when litmus does not make any such accusation. I cannot get a chemist to devise any simple quantitative test of vaginal acidity.

Studies of the reaction of a vaginal secretion on a particular semen is of limited application to most doctors in office work and tests carried up into the cavity of the uterus are subject to too many errors to belong to any but a few experimenters. Some of these mooted points are touched on in the second paper.

Retention of semen by a condom-covered tampon inserted at once after emission may be tried when the vulva gapes, but my various experimental modifications of pessaries to develop a semen trap have not worked.

Tests of the patency of the tubes will be routine when the procedure is standardized. I tried Cary's injection of silver salt, with vague roentgen shadows. Cary's simple instillation of sterile fluid in the genupectoral posture is promising. If it disappears in quantities over 10 minims the way should be clear. My trials that show free passage of semen have demonstrated patency in the same way. These are infinitely easier, though less certain, than the injection of oxygen and its appearance under the diaphram—calling as oxygen does for apparatus and special skill—and not without distressing sequelae.

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Lastly, we rule out of consideration patients with gonorrhea or suspicion thereof, tubal distention or tenderness and inflammatory processes of any degree in the pelvis.

TECHNIC. During the office examination one selects the shortest or smallest bivalve speculum that will make a good exhibit of this particular cervix in the knee-chest position, and also tests a snug-fitting curved pipette in the internal os. A note or mark is made on the pipette to show how far up 10 minims will fill its caliber. After a date is made—to follow a week of continence—the husband is given a sterile test-tube, dry and corked. He is directed to wash carefully and secure a friction specimen about an hour before the appointed time, taking care that the inside of the cork makes no contacts and to keep the tube warm but not hot, under a warm water bag or in a thermos bottle. He is to verify by telephone a successful production.

The following are sterilized: Bivalve; single tenaculum; two or three pipettes in test-tubes; applicators, cotton-tipped, and towel and tray on which to lay out the above. (Forceps and scissors in case condom specimen is to be used.) All water is to be dried out of the pipettes.

At the home some third person is to be near at hand though not necessarily in sight. Good illumination is needed—drop-light and head-mirror or head-light preferred. Bladder and bowel are empty. All the materials are spread conveniently at hand. The patient takes a real knee-chest posture at the edge of and across the bed. The bivalve gives a clear view of the ballooned vagina, and also a free play to the uterus such as cannot obtain with this instrument in the dorsal posture. This free play is important in gaining ready access to the cavity of the uterus. The tenaculum steadies the cervix and serves to draw open the canal, which should rarely need to be wiped and on which no antiseptic should be used. The pipette is now very gently filled above a point known to be 10 minims. (The uterus holds 8 to 10 minims.) The tip touches first the interior of the cervical canal as high as may be and is passed to near the fundus. The fit to the internal os prevents regurgitation,

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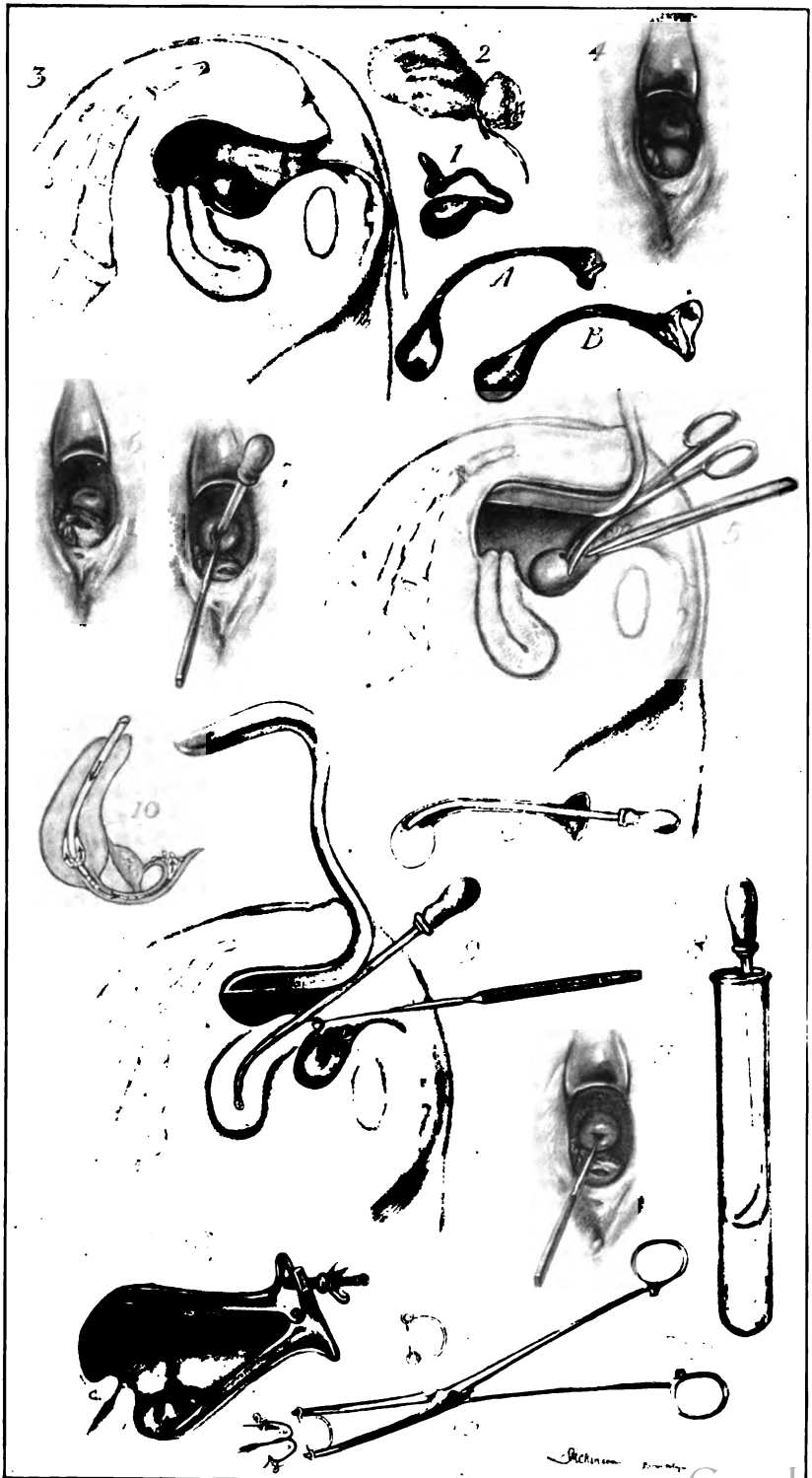

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FIG. 1

DESCRIPTION OF FIG. 1

FIG. 1.—Methods on trial in past years. Part of author's exhibit at the International Congress in London in 1913. The condom as the reservoir, pipette instillation, clip closure of cervix. *1*. The neck of the condom twisted, after ejaculation, without removal from the vagina. *2*. The tampon that is introduced before rising to hold the condom in place in order that the patient may come to the office. *3*. The patient in the knee-chest posture. *4*. The speculum in place. *5*. The cover steadied with a forceps and slit, as seen in *6*, *7* and *8*. The Skene pipette, sterile dry and warm, sucks from the slit and injects as shown in *9*, into or through the tube, as *10* gives it diagrammatically; *11* is ready for the clip. *12*, placed by a Bozeman forceps as seen in *13*, before and after placing. Alternate plans are given in *A*, and *B* the condom uncoiled with its head still in the vagina, *C*, the pipette passed into it; finally *D*, employing a bivalve in lieu of a Sims speculum when one dispenses with a nurse.

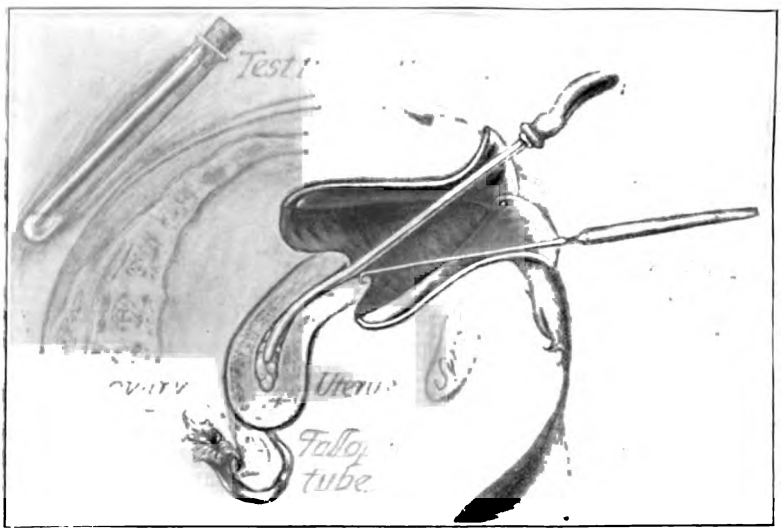

FIG. 2.—Insemination, using a short bivalve speculum, a single, well-angulated tenaculum; a pipette with the curve of a uterine sound and of a size to fit the internal os, and a large rubber bulb. The body of the uterus is shown distended with semen.

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or, if it does not, one makes a change. Gentle, steady pressure is made on the bulb until "unwell feelings" are produced and continued until there is consciousness of slight distress in the sides of the abdomen low down, at which time the Fallopian tubes are presumed to have fluid in them. Then pipette, tenaculum and speculum are withdrawn and the patient slides onto her side with the hips a little elevated, to remain thus at least an hour.

The Skene uterine pipette is a bit thicker than a uterine sound and curved like the sound. Its opening must not be minute, as Huehner's curled-up forms of defunct spermatozoa are produced by quick suction through narrow orifices. The advantage over any syringe is that the contents are all in sight, the interior is easily cleaned and various sizes are at hand. The sharply recurved single hook of Emmet does not give the discomfort of the heavy double forms.

Variants in the above methods. As a substitute for ejaculation into the test-tube one is reluctant to concede the use of the condom, as it presents many more possibilities of contamination. The vulva and the penis are washed and coitus occurs with the condom. The contents may be kept warm in two ways: One way is to tie the mouth and drop the condom into a test-tube, which is laid under a warm water bag. The other takes care to leave the cover and its contents within the vagina, twisting the part hanging out and returning this part inside the passage. Under these circumstances there can be no danger of chilling or overheating and thus damaging the specimen. When ready to inject, the patient having taken the knee-chest posture and the speculum being in place, the condom is steadied with forceps and slit with scissors to let the pipette suck out the amount needed. When insemination is done at the office this has been the usual method, the condom having been retained by a tampon furnished to and placed by the patient. Finally it may be noted that one genito-urinary specialist obtains a fresh specimen for injection by providing facilities for coitus at the office.

When autoerotic or cover processes completely inhibit a spec-

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imen may be obtained by slipping the mouth of a sterile test-tube within the opened labia immediately upon withdrawal. Washing of the genitals of both should have preceded this also, and it is a last resort. The device is worth remembering, however, for another purpose. This method of collection is the only one by which semen can be secured in sufficient quantity to be passed upon in those instances in which a man avers that he is desirous of having children but declines to take the steps necessary to prove that the lack is not his. Some such plan is needed when he asks or consents to operation on his wife but declines an essential preliminary, since no surgeon nowadays is excusable for any operative measure (or course of treatment) on a woman for sterility until he can vouch for a good quality of male product—a product, moreover, which must be shown to be existent at the present time and not merely capable of fecundation in years gone by.

OBJECTIONS. 1. The possibility of infection of tube and peritoneum cannot be excluded, but normal insemination involves something travelling an inch an hour from the vagina —after labial and subpreputial "smears"—up into the uterus or tube or peritoneum, and all canals exhibit some reverse currents. If we use semen that has spurted clean into a sterile test-tube and the cork is safeguarded a specimen above reproach seems to be furnished. To be sure, material from the canal of the cervix may be carried on the tip of the pipette and thrown into the tube and reach the peritoneum. (Curtis has posted us on bacterial travels.) But in the absence of gonorrhea, of mucopurulent leucorrhea or cervical catarrh production of salpingitis or peritonitis seems to the writer unlikely with a good technic. As far as symptoms go I have to report, among 31 women, none with a uterine colic, one with a half-hour tubal colic and one in bed several days with discomfort but without exudate or tender tube.

2. Old tubal disease may be lighted up anew. It may, for a tubo-uterine orifice never closes. For the present at least such cases should be avoided.

3. It is possible that all that injection of semen accom-

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plishes is to open the tube, in which case other fluids would do as well and antiseptically be safer, as used by Stone and Bovée. Only tests can tell.

4. One can have no assurance that coitus subsequent to the treatment was not the real agent in procuring conception. Entirely true, and the reason the veterinary surgeon can offer proofs we cannot.

5. It fails with semen not vigorous. There is the rub. It was devised for just such cases and it has not helped so far.

6. The field is very limited because patients revolt at the idea or give it one trial instead of half a dozen. They prefer laparotomy. All this is exact, but it does not relieve us of the responsibility of preventing the patient taking the greater risk should there be a safer, simpler way, did we but have the will to face the distastefulness of working it out.

Uterine Instillation Insufficient. The material injected into the cavity of the body of the uterus seemed to drain out promptly. This was probably because of the intermittent contractions, normal and constant, in non-pregnant uteri and because a degree of opening up of the internal os had occurred in making the deposit. To overcome this, vaginal tampons were tried and abandoned. A clip was built to snap on the cervix and prevent exit of the semen, but it was not effective. Therefore the deeper placing of the seed was undertaken. All good results have been since this time.

Repetition. Three attempts at monthly intervals should be the minimum and six should be asked, explaining that this is no unusual time for normal means in normal people to require. As to the time of the month, three of our conceptions followed injection within a week of the expected period, the period coming on incompletely.

Summary. In women presenting histories or pelvic findings pointing to the sealed tube following milder types of salpingitis, entirely quiescent, injection into the uterine cavity of active semen produced no results in twelve instances. Strong pressure was not deemed warranted.

In women with no gonorrheal histories or findings, free

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from cervical inflammation and evident uterine, tubal or ovarian lesions or abnormalities, living semen of the poorer grades produced no results in nineteen patients. No infection followed except in one possible instance, and that of mild type. Several of these received three trials.

With normal pelvic organs and semen showing multiple quick travellers, living some hours at room temperature and examined just before injection, five pregnancies followed and are believed to be due to tubal insemination. The knee-chest posture, the curved pipette carried to the fundus and fitting the internal os, injection into the tubes and horizontal rest afterward are considered important. Trial of this method may well precede resort to operations for sterility, excepting those done for external obstructions.

DISCUSSION OF THE SYMPOSIUM ON STERILITY (PAPERS OF DRS. CHARLES G. CHILD, JR., AND ROBERT L. DICKINSON)

DR. EDWARD REYNOLDS, Boston.—I think Dr. Child is to be congratulated on his showing of operative work in tubal sterility. Seven successes is a large number for any man. He did not tell us what the total number of operations was. We may assume that it came from a large series of operations, because it is the universal experience that the percentage of successes in opening closed tubes is small. To have gotten as many even from a large experience he must have done nice work.

My own experience is that tubal cases are very unsatisfactory cases for operation. We get few successes. On the other hand, my experience is that cases in which the trouble is in the ovaries are extremely favorable. I am having the records of my cases looked over, and I hope in the near future to be able to present the end-results of my series. I have worked over them enough myself to be sure I am able to present a good percentage of successes after conservative operation on the ovaries wherever the tubes were in good condition. Where one tube is in trouble

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and the other is normal, *i. e.*, a mild salpingitis on one side, a closed tube without much change in it, while the other remains normal, the woman is invariably sterile. Microscopic examination of the secretions will teach any one familiar with them that there is drainage from the affected tube into the uterus and this fluid destroys the spermatozoa. In practice, if you find on operation that one tube is normal and the other tube closed, complete removal of the injured tube, the closed tube, with exsection of its interstitial portions from the cornu, will almost invariably, in a very large percentage of cases, result in immediate fertility if the husband is thoroughly good. Those are the only favorable tubal cases I know of.

Artificial impregnantion is a subject of a good deal of interest, and one of which I am rather skeptical. Dr. Dickinson has reported the cases of three women, with success in two of them. That is a higher percentage than is usually obtained, and perhaps due to his method of injecting the tubes.

I would take issue with the statement that these results can be obtained better than by operative work. It is not a high percentage as compared with the other work. I do not believe it is free from risk. I have seen in the course of my experience a considerable number of cases who had artificial impregnation attempted and a pretty large proportion of them have had tubal trouble. I do not believe artificial impregnation usually has a high percentage of success, not that it is altogether harmless.

As regards urging semen through the tubes, it strikes me as unphysiological. I should want to see a large number of successes before I was ready to use it. In nature semen never reaches the tubes. In natural impregnation postcoital examination shows that the non-living seminal elements do not even enter the uterine body. The cervix is full of them. The spermatozoa, and the spermatozoa only, go higher by unaided motility. The use of artificial insemination promiscuously without careful isolation of these cases which are due largely to cervical obstacles, I believe to be thoroughly unscientific and not free from danger. It comes down, in short, to the general principle that the routine adoption of any procedure for a condition which is the result of multiple and varying causes is poor practice. When cases have been isolated as appropriate for artificial impregnation, it is another question.

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DR. JOHN O. POLAK, Brooklyn, New York.—I think the keynote was struck by Dr. Reynolds as he sat down, and that is individualization of the cases of sterility. It is remarkable in the study of these cases to see how many of the male elements are inefficient. In a study we made and presented to this Society of 687 cases, there were 301 of these women who were free from inflammatory histories that could be considered as possbly becoming pregnant; that is, free from a definite gonorrheal or postabortal history. Out of this number of men to whom these women were married, it was found that 90 of the men could not impregnate the women because they were sterile.

An interesting point was brought out by one of the speakers —Dr. Dickinson, I think—was that they seemed sterile today and non-sterile tomorrow. I have had a number of these cases where reports have come in of men who were sterile, and yet with little treatment the women have become pregnant. These men may have lived with their wives for two or three years without any pregnancy having taken place. We would send them back and we would find them sterile again, and after treatment they were able to produce another offspring.

Personally, our experience has been that the largest proportion of our cases of sterility are due to endocervicitis and some change in the secretion at the cervix. Here again, it is remarkable how the cervical secretion will change in the same woman. Women will go for periods of eight or ten years sterile, yet with the simple application of practically nothing to the cervix outside of such remedies as iodin and glycerin they promptly become pregnant after that treatment. There is no question in our minds that endocervicitis is a great factor.

I congratulate Dr. Child on his report. I have done 100 salpingostomies, and one woman has had three children from a resected tube. I have had seven ectopics as a result of my salpingostomies, which is interesting, and probably due to a defective procedure I carried out.

In regard to Dr. Dickinson's proposition, I feel very much as Dr. Reynolds does. I should like to know the cause of the sterility and would like to be reasonably sure before injecting semen into her uterus. I have tried it several times, and I have gotten a reaction because I made such a bad selection of cases. I have dropped it, and I now refer those cases to Dr. Dickinson.

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DR. ISADOR C. RUBIN, New York City (by invitation).—The papers of Dr. Child and Dr. Dickinson have been very interesting to me. I wish to congratulate Dr. Child upon his brilliant results. It would be well to know the total number of cases he had operated on for the condition of tubal occlusion, and especially those in which he had no success.

The value of a test other than surgical to determine whether tubes are occluded or not can be illustrated in 2 cases in my experience. One occurred in my practice a number of years ago. A woman had been married three years and was sterile. I found in making an examination a slight thickening on either side of the uterus. I went over the possibilities with this patient, tried all tests, and found her husband absolutely potent, and decided I would give her the benefit of a tracheloplastic operation. She remained sterile. A year and a half later I heard indirectly from a colleague that she had been "butchered" by the operation; that is, that was the conclusion she came to following the consultation of a certain gynecologist, and she visited many others for relief of her sterility. She was then told that the cause of her sterility was the torn cervix (post Pozzi); also that she had definitely diseased tubes and ovaries due to infection resulting from my operation. It was very disagreeable naturally to hear these things about an innocent operation. If it had only been possible for me to have her consent to a laparotomy at the same time that I did the Pozzi operation or could have employed some method whereby I could determine whether the tubes were patent or not, I would be in a better position to defend myself.

The second case I had three weeks ago. Returning from the New Orleans meeting of the American Medical Association I found a case in the ward at Mt. Sinai that well illustrates the value of such a diagnostic method. The patient had been married three years and was sterile. She had been examined by the staff and a slight thickening on one side was made out. Four days before my examination of this patient she had had a curettage and stem pessary insertion calculated to relieve her sterility. I removed the stem pessary and introduced oxygen into the uterus and found the tubes absolutely non-potent. We did a laparotomy the same day and found bilateral hydrosalpinx. Both tubes were slightly adherent, but not very much distended, the walls being flaccid, therefore accounting for the

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practically negative physical examination. This case was typical of numerous cases in which the same or similar procedures are done to cure sterility, and yet the cause of the difficulty is not in the cervical canal but rather higher up in the tubes. The method of intra-uterine inflation with oxygen to determine patency or occlusion of the Fallopian tubes by establishing a pneumoperitoneum or failing to establish a pneumoperitoneum can make the indication for the type of operation that should be done. So far I have tried this method in 100 cases, that is since November 3, 1919 to date, and have found it absolutely safe, well tolerated by the patient and reliable for the data for which the method was intended.

With reference to Dr. Dickinson's paper, there is no doubt that his results are most encouraging. I was especially interested in his observation that the uterus does not tolerate fluids like collargol, thorium and silver injections. I found this to be the case in my early experiments. Oxygen, however, is very well tolerated up to a certain pressure. These women complain of slight pain from the intra-uterine pressure and distention varying for the individual. The pressure ranges between 50 and 70 mm. in the average patent case. When the tubes are occluded the pressure rises to 210 to 220 or more. I do not recommend carrying the pressure beyond 200. In those cases we have had an opportunity to test and control later by laparotomy we found the tubes to be closed where the pressure was 200.

Dr. George Gellhorn, St. Louis, Missouri.—Nine years ago I presented a paper on salpingostomy in pregnancy, and at that time I reported the case of a woman who had conceived. She has had a second child since. I have had 2 more cases which terminated in miscarriages. This, of course, has nothing to do with the operation. I have done in all about 40 salpingostomies. I have, however, never done an operation solely for the purpose of opening tubes, but only when I found the tubes occluded in the course of a laparotomy have I opened the occluded ends. The number of operations was further cut down by the fact that I excluded all cases of inflammatory origin. The condition of the tube, more particularly, the thickening of the walls, was the first criterion. In short I limited the operation to cases where the occluding factor apparently came from without the tube rather than from within. This, then, leaves practically

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only those cases of tubal occlusion for operation, which have been caused by a previous appendicitis or ectopic pregnancy. If performed with such limitations, salpingostomy carries with it no dangers of any kind.

DR. N. SPROAT HEANEY, Chicago.—I would like to ask if any particular time was observed in relation to the menstrual periods in these cases that were injected?

I have been considerably interested in the question of sterility because of the fact that in addition to being a gynecologist and obstetrician, I am a dairy farmer. Sterility in the dairy world is an important topic and is of the greatest economic importance at the present time with high priced foodstuffs prevailing.

Last fall we were awakened to the fact that about one-half of our dairy herd was sterile. We called in a veterinarian and had the whole herd examined in order to separate the pregnant from the non-pregnant animals. The records of the non-pregnant animals were looked up and we found out when they had last conceived. In working with live stock we do not have the difficulty which Dr. Gellhorn mentioned and which makes the question of sterility in gynecology hard to become interested in. It takes such a large number of cases in order to reach any logical conclusion. In the dairy world we can follow each case to a logical conclusion. Examination of the bull showed that he had perfect semen. We found ten cows sterile. When a cow does not conceive after two services, something is the matter with her. Ordinarily such cows are sent to the butcher, but in a pure bred herd such a procedure represents a big sacrifice. One of these cows had an infantile uterus and after killing her, autopsy supported the clinical diagnosis. A second cow, a very valuable animal which had recently miscarried, due to specific abortion, which miscarriage was followed by septicemia, showed upon examination a large swelling of the left tube and ovary. Examination produced a recurrence of fever and the cow became very sick. Upon killing this cow we found she had an extensive tubo-ovarian abscess. All the remaining cows showed normal genitalia, except for extensive cervical erosions and high grade endocervicitis. These cases were all treated with applications of iodin to the cervical canal for periods of two or three months until satisfactory local conditions were obtained before rebreeding. Six of these cows are either now pregnant or have delivered.

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Two of these cows resisted treatment so that recently I operated upon them. In each I did a dilatation of the cervix and an amputation of the cervix following the technic very closely that I use in the human. These cows have patent cervices and I feel confident that the operation will be successful.

Dr. Herman J. Boldt, New York City.—I would like to ask Dr. Child what he means by resection of the ovary in his cases. It is very interesting to me to hear his report, and I congratulate him on his results. I consider it the most valuable contribution that has been made on the subject to date, particularly with regard to the diagnosis to determine whether a tube is patent or not.

With regard to operations on the Fallopian tubes, a large number of patients are sent for operations upon the Fallopian tubes, recommended by gentlemen whom they have consulted, the family physician or otherwise, where careful examination has failed to show any pathologic condition of the Fallopian tubes, and for that reason, if we can determine that such tubes are patient, it is all right, but to open the abdomen and do tubal operations without any objective symptoms is not a correct procedure.

One word in favor of the general practitioner. There was a time when it was found that in 90 per cent. of patients who consulted physicians for sterility the husband had not been examined.

Dr. Lewis S. McMurtry, Louisville, Kentucky.—The very basis of a satisfactory consideration of this subject is presented in the remark of Dr. Reynolds in the discussion, and that is, the causes of sterility are so multiple and varied that there cannot be any scientific elucidation of the subject until we know more accurately the causes of sterility in both male and female. Let us see some of the contra-indications that we encounter. In the first place, it is common observation—more common years ago than at present—that in multiple lacerations of the neck of the uterus the operation of trachelorrhaphy, restoring the cervical canal, closing it, as it were, is very frequently followed by pregnancy when years have elapsed without conception. On the other hand, the most abused operation perhaps in gynecology, especially in the hands of the general practitioner,

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consists in forcible dilatation of the cervix uteri in an effort to cure sterility. Young women get married, go for two or three years without conceiving, go to a physician, and at once he proceeds to dilate the uterus and perhaps do a curettement at the same time, thinking she will, as a result, conceive. That is a contra-indication. We close the uterus in 1 case, and in another open it.

There is something about the internal secretions that has a great deal to do with sterility, although our knowledge of it is incomplete at the present time. Let me mention this one observation. In the mountains of Virginia, Kentucky and Tennessee, where people lead the simplest life, and where they have the poorest obstetrical attendance, where gynecologists are unknown, the families are large, six to twelve children in a family. Undoubtedly the frequency of infection is lessened by their isolation and simple mode of life.

Dr. Charles G. Child, Jr., New York City (closing the discussion on his part).—In answer to Dr. Boldt's question as to what I mean by resection of the ovaries, I will say that I had reference to those cases in which the ovaries are enlarged, studded with multiple cysts and the cortex thickened, that the Graafian follicle could not rupture and discharge its ovum, as denoted by the absence of any scar of a previous rupture. In both of these cases one ovary was decapsulated, that is, the capsule was stripped off to get rid of the thickened covering, and in 1 case the other ovary was resected as well.

Dr. Robert L. Dickinson, Brooklyn, New York (closing the discussion).—If it works on the cow it might work on the human individual that has nine months gestation also. I wish a veterinarian had told me of the insemination of cattle because I understand that is a regular performance nowadays.

I can add 2 further cases to those spoken of, two of Dr. Carey's. This work means that this kind of thing is worthy of trial.

I should like to emphasize again the fact that semen does not enter the uterus true to form, and that we have got to study our semen.

Slemons has published a paper in which he reports 186 laparotomies and advises that where a woman does not conceive she should be subjected to laparotomy and something done to

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her uterus, ovaries and tubes. He has cured most of his cases by this means.

Dr. Gellhorn raises the objection that you cannot examine the husband. You do not have to examine the husband. You can give the woman one of the rubber bulbs that they use for injecting various fluids into the urethra of the male. She takes that to bed with her, puts it under her pillow, and immediately after coitus she slips it into her vagina, and she has a specimen to bring to your office.

Lastly, I wish to repeat that unless we begin to report these cases we will never have any reliable data from which to draw conclusions.

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RECENT PROGRESS IN OBSTETRICS

By Hugo Ehrenfest, M.D.
St. Louis, Mo.

When readily accepting the suggestion of the Council to read a paper on "Recent Progress in Obstetrics," I was under the decidedly erroneous impression that in the turmoil of the War probably comparatively little had been published in the medical literature of the world that could prove of particular interest to the obstetrician. When starting actual work in the preparation of this paper the error of this assumption became all too evident. This survey of the obstetric literature of the past three or four years, concise in spite of its apparent length, is based on the more or less careful perusal of several hundreds of papers and monographs covering many thousands of pages. A brief summary of this sort requires by way of introduction a few words of explanation and also of apology.

Obviously, only a very small fraction of recent contributions can be actually mentioned. Thus I was forced to prepare, instead of an objective *resumé* of the obstetric literature, rather a critical review of only that material which, in my opinion, is interesting and represents an advance in knowledge. Under present conditions, furthermore, unusual difficulty is experienced in gaining access to foreign literature. Up to the present day it is available in medical libraries only in very incomplete form. Many of the obstetric and gynecologic journals of Europe during the war had temporarily or permanently discontinued publication. This holds true for the one journal of this kind in Great Britain and at least for

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three of France. The situation seems identical in Italy. Russian literature fails to appear even in abstracts in other periodicals. Peculiarly enough, of the many German gynecologic journals only one, a pure abstract journal, obviously was forced to discontinue publication temporarily. All the others, in almost complete files, are again to be found on the shelves of the two medical libraries at my disposal in St. Louis (Washington University and St. Louis Medical Society). This fact together with the desire, for the sake of brevity, not to take up too much space with American literature (known to you, and indeed, mostly written by you) will easily, and I trust satisfactorily, explain the obvious prevalence of quotations from German literature in the following pages.

One of the German writers quite frankly states that the surgeons, epidemiologists, pathologists, etc., have made ample use of the unusual opportunities offered by the War for solving many interesting and important questions, that, therefore, also the gynecologist should not let pass this unusual chance of studying on material, not available under normal conditions, certain theoretical and practical problems of special interest to him.

Siegel was among the first to realize the probable value of a careful study of short, two and three days' leaves of absence, given to married soldiers, in their possible bearing on such questions as: the most favorable time of conception in the menstrual cycle; determination of the sex of the child; duration of pregnancy, etc.

His very first paper created a great deal of interest, and abstracts were quoted broadcast also in American literature. In Germany it induced many investigators to start researches along the same or similar lines. The two main startling observations recorded by Siegel, briefly stated, are as follows:

1. Of 300 one-time cohabitations, resulting in pregnancy, in 53 per cent. coitus was performed on the sixth day after beginning of the last menstruation. The high incidence of conceptions continues up to the twelfth and thirteenth day and then drops rapidly.

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2. Conceptions occurring within the first nine days result in boys; conceptions between twenty-second and twenty-eighth day in girls.

This latter point he used for elaborate theoretical discussions of the problem of sex determination by the definite selection of the time of cohabitation.

It will be more convenient to dispose right here of the literature on this latter problem, one of never-failing interest to physicians and laymen. No other investigator was able to duplicate Siegel's findings. They undoubtedly are the accidental and erroneous result inherent to statistical studies based on small numbers of observations. While Moesser, Peller, Richter, Loenne and others are unable to find any noteworthy difference in the sex of the child in relation to the time of fertilizing coitus, others supply figures worthy of consideration; some at least in part supporting Siegel, others directly contradicting him.

Ruge considers his personal experience as too limited, but collects from literature 521 war cases, in which cohabitation time is exactly known. From them he figures for impregnations between first and ninth day after menstruation 65 per cent. boys; for impregnations between fifteenth and twenty-second day 62 per cent. girls. In consideration of a normal ratio of 53 boys to 50 girls, the early postmenstrual conceptions show—not to the extent claimed by Siegel but still in accord with his findings—a definite increase of male births, the premenstrual conceptions a striking prevalence of girls. But that even such figures cannot be accepted as valid proofs of Siegel's theory can be easily seen when we find that Nuernberger in 215 personal war observations discovers exactly the normal relation of 105 boys to 100 girls for early postmenstrual impregnations; while, on the other hand, Pryll in a large number of peace cases, in which the time of cohabitation also was exactly known, discovers that fertilizing premenstrual cohabitation resulted in a surplus of males in the proportion of 2 to 1.

To support his contention Siegel is forced to deny the

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generally accepted view that an intervening menstruation destroys an unfertilized ovum present in the genital tract. He speaks of an "over-ripe" ovum, which had survived through a menstrual flow, and which, when fertilized, invariably develops into a male child. Siegel fails to find any supporter for this hypothesis, and it seems that the hope, that war observations have led to a final solution of the problem of sex determination, remains unfulfilled.

Kroehl's like Ruge's figures show that coitus in the period between the sixth and thirteenth day is most likely to result in a pregnancy. Pryll's peace curve coincides well with a curve made by him from 713 war cases collected from literature, which indicates that in 60 per cent. of the one-time cohabitations the coitus had been performed on the eighth day after beginning of last menstruation. Nuernberger finds that of his 215 war cases in 41.3 per cent. cohabitation fell into the early postmenstrual period, in only 9.3 per cent. in the premenstrual period and in the remaining 49.4 per cent. in the interval. While not strikingly in agreement with the observations of Siegel and others, Nuernberger feels that his own figures at least show the evidently greater chances of conception for cohabitations soon after menstruation, and the definite decrease of this chance for the premenstrual period. He also points out one obvious defect of all these statistics, namely, that really accurate deductions concerning an optimum of conception could be made only if it were possible to compare the number of fruitful cohabitations with the total number of all cohabitations consummated within the same period—an impossible task.

Personally, I would raise still another objection, to my knowledge nowhere made. This high incidence of early postmenstrual cohabitations, quite uniformly ascertained for pregnant women seen in maternity clinics, at least in part, could be but the natural result of a preference of short leaves of absence for a time when the wife most likely would not be menstruating; this is the week immediately after a menstruation. It is well known that wedding days customarily are chosen in this manner.

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Logically, this extensive discussion of a possible optimum of conception also led to renewed interest in the question of the exact time of follicle rupture and of the duration of life of the spermatozoid.

The time of ovulation is not definitely known. While Fraenkel places it at eighteen or nineteen days after the beginning of the last menstruation, others, among them in his recent study Ruge, claim it to occur, as a rule, between the eighth and fourteenth day, conceding that exceptionally the follicle may not rupture until the third week of the cycle. The war observations, quoted above, in general tend to support Ruge. It seems most plausible that the optimum of fertilization exists when a fresh spermatozoid meets a fresh ovum, *i. e.*, when cohabitation occurs soon after the follicle rupture. The fact, agreed to by all investigators, that ovulation late in the cycle is rare, satisfactorily explains the general observation of the low percentage of conceptions from premenstrual coitus.

Ruge in one of his papers discusses thoroughly the question of the assumed longevity of the sperma cell, in his belief based on faulty deductions made from observations on animals. All available evidence, in his opinion, clearly points to the fact that both for the human ovum and for the spermatozoid, life is limited to but a few days. The spermatozoid, entering the female genital tract late in the cycle, will encounter a fresh and impregnable ovum only if ovulation had occurred exceptionally late.

Pryll from a careful analysis of 713 pregnancies following a single coitus calculates that a spermatozoid may keep alive up to between six and ten days. Ignorance concerning the accurate time of ovulation makes it impossible to give this figure more exactly.

The entire problem is comprehensively set forth in a most instructive paper of Grosser, an expert embryologist. In all mammals, ovulation, impregnation and conception practically coincide. Recent investigations, in his belief, seem to concur in the observation that conditions are not very different in the human; surely that the time interval between ovulation and

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fertilization is so short that it might well be neglected. Neither the ovum nor the spermatozoid remain very long fit for their biologic function. If all investigators concur in establishing a maximal opportunity for conception around the eighth or ninth day we are forced to the conclusion that this, in all probability, is the time of ovulation and fertilization of the ovum. Under normal conditions the implantation of the fertilized ovum seems to occur approximately on the twenty-second day, presumably ten days being consumed by the ovum for its passage through the tube, another four days for further development in the uterus to reach the implantation stage of development. This would closely resemble the condition actually established for the dog.

The unusually large number of pregnancies resulting from one-time coitus, which had been observed during the war years, has not offered any new information concerning the duration of pregnancy. Nuernberger in 206 such cases found labors to occur anywhere between 253 and 297 days after the coitus. The old Naegele method remains the only available method of calculating the probable day of labor.

Fehling calls attention to the striking fact that since the beginning of the war, with increasing frequency, he sees pregnancies after a state of primary or secondary sterility. He terms this type of cases "war pregnancies." Various papers deal with this phenomenon and many explanations are offered. A few might be mentioned here: The enforced sexual rest favors the spontaneous cure of slight inflammatory processes in tubes and uterus responsible for this sterility. The enforced sexual abstinence increases libido of both the husband and wife. Some speak of an "invigorating" influence of sexual and alcohol abstinence on the sperm cells. When, however, identical observations are also recorded in families in which the husband stayed at home, some writers suggest that this increased fertility might stand in a relation to the evident decrease of excessive adiposity as the result of undernourishment and heavier work.

This brings us to the consideration of another large group

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of papers which deal with the possible etiologic relation of malnutrition, heavy work and mental excitation under war conditions to various obstetric and gynecologic anomalies.

A discussion of fascinating interest is carried on concerning eclampsia. As early as 1916 Warnekros shows that practically all large maternities have noticed a material decrease in the number of eclamptic patients. During the next few years various theories are propounded to explain this undeniable fact. Mayer speaks of a toxic effect of sperma, resorption occurring in the course of pregnancy when sexual relations continue uninterrupted under normal conditions. A corresponding benefit is derived from the absence of the husband in war service. This hypothesis evidently has not met with favor.

Warnekros in discussing this point emphasizes that the majority of writers seem to regard more acceptable an explanation which ascribes the reduction in the number of eclampsias to the marked deficiency in fats, and especially in proteins, of the war diet (Ruge). But many objections are raised also against this theory. Mayer asks: How can this explanation be made to harmonize with the indisputable increase of nephritis during the War also ascribed to food conditions? Franz answers: "War nephritis" is the result of the many epidemics of various infectious diseases which have swept through Europe. A gynecologist serving in the Austrian army enters the discussion by offering statistical proof that the soldier, physically exhausted and frequently exposed to colds, is likely to develop a nephritis merely from the toxicosis caused by the various prophylactic vaccinations. Therefore the evident frequency of "war nephritis" has no bearing on the eclampsia problem. Gessner thinks that the seeming benefit of the war *regimé* to the pregnant woman in avoiding eclampsia is entirely due to the successful prevention of overeating in combination with the necessity for more physical activity. Zangemeister doubts the feasibility or possibility of establishing statistically any relation of changed food conditions to this undeniable reduction of eclampsia patients, and

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feels satisfied, from his own studies, that this decrease of eclampsia is almost proportionate to the decrease in the birth-rate. With that sagacity often noticeable in Lichtenstein's controversial papers he discusses and repudiates all these theories. An analysis of the eclampsia patients treated in the large German maternities in prewar years shows that a considerable number of them had been brought from distant places. The inefficient and at times completely interrupted railroad service, the absence of all automobiles, the notorious inadequacy of ambulance service for the civilian population and the crowded conditions of all hospitals, necessarily prevented many eclamptic women from being admitted to hospital wards. To this probably large numbers of patients unable to reach the clinics must be added another group which now is kept out of the hospitals by the attending physicians. The insistent teaching of obstetricians during the past decade that forced delivery is not the only method of dealing with eclampsia, that the conservative treatment is useful, and, indeed, preferable in many instances, fortunately is beginning to bear fruit. The practitioner has finally learned the technic of the Stroganoff therapy which can be successfully carried out in the home of the patient. Also after the return of normal conditions the larger maternities will see fewer eclamptic patients than before the war. Whether this very plausible explanation of Lichtenstein is correct or not is a question which will have to wait for a final answer until postwar experience has revealed whether this decrease of eclampsia was only temporary or permanent. Lichtenstein's point, however, seems well taken. A very exhaustive monograph of Winter culminates in the assertion that in the future the discussion of eclampsia therapy not any longer can deal with the problem "operative *versus* conservative" treatment. Both now are firmly established and have their respective definite fields. Both are advantageously combined in some cases.

This controversy on the apparent decrease of eclampsia probably indirectly is responsible for many other papers dealing with other phases of this toxemia. Ruge and others again

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emphasize the etiologic importance of defective liver function, first suggested by Dienst. Others, among them Schickele, in an exhaustive study, argue vigorously against this conception.

Zangemeister restates his former contention that the eclamptic convulsions are caused by abnormal intracranial pressure, the result of an acute edema of the brain, which in turn is brought on by the increased blood-pressure. Proper eclampsia treatment must attack prophylactically the cerebral edema by reducing therapeutically the high blood-pressure. Entirely in accord with this theory seems Kirstein, who finds the pressure of intraspinal fluid normal during normal pregnancy, but markedly increased in eclamptic women, proving the existence of abnormal intracranial pressure. The convulsion is released by a further exaggeration of the already abnormal blood-pressure which, during the seizure, causes an added rise in the intracranial pressure.

It occurred to Lichtenstein that a study of the effect of war conditions on hyperemesis gravidarum might throw some light on the problem of the causation of eclampsia. He ascertained that, like in eclampsia, there seems to exist also a falling off in the number of patients suffering from hyperemesis. An actual decrease, he argues, might be shown statistically and still it would be impossible to employ these statistics to prove the dignity of this or that etiologic element as long as we know that calculations will have to include such uncertain factors as nervous, mental or internal secretory disturbances. We possibly can say that any numerical reduction of these cases speaks against any notable etiologic significance of the mental factor, since all kinds of severe psychic insults and emotions during the war undeniably have affected pregnant women more extensively than ever before. In a general way one is forced to the conclusion that the necessity of leading a more active life, of taking more exercise and of having less time to brood over her discomforts, over real and imaginary troubles, as a whole, had a beneficial effect on pregnant women. Also the theory of the solely ovular origin of the eclampsia toxins must lose some of its present popularity, and in accord with

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this change of view the indications for artificial termination of pregnancy in hyperemesis will have to be further restricted. Winter, on the other hand, emphasizes the etiologic significance of the psychogenetic factor. Careful and at the same time tactful questioning, which in his experience apparently can be done with greater ease under present conditions, in many of his hyperemesis patients very clearly revealed the responsible psychic element. Relief of the symptoms promptly following proper psychic treatment also convinced him of the correctness of his views. Winter's conception, answers Sigwart, surely is out of harmony with modern teaching and experience. As further proof for the fallacy of Winter's conclusions he details several experiments he made on patients suffering from hyperemesis. Some he made to believe that the ovum had been removed, others he deceived concerning the actual removal. In both groups the attempt to either stop or continue the symptoms by means of strong suggestion failed. Only the one fact stood out clearly, that whenever the pregnancy was interrupted vomiting actually ceased.

Many papers deal with the assumed deleterious influence of war conditions on other phases of pregnancy and labor. Notably German contributions, published early in the War, dwell upon the disastrous effect of malnutrition on the pregnant woman, entirely the result of the food blockade, which is rarely mentioned without the additional descriptive adjective "criminal." Reports, appearing later, sound less distressing. It has been mentioned in the foregoing survey of the eclampsia literature that after most exhaustive discussion of the question finally the reduction in the number of eclampsia patients by some writers was ascribed to the practical impossibility of overeating. Loenne, in summarizing literature on the question, emphasizes that, contrary to earlier claims, the average duration of labor seems to have been shortened, possibly on account of better muscular development from enforced physical activity. This is particularly evident in the case of the old primiparæ, observed in increasing numbers since the beginning of the war. No change in the frequency of required

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instrumental deliveries, in maternal mortality or in the ratio of the sexes among the newborn can be demonstrated. He believes that the average of birth-weight has decreased, but in this point is emphatically contradicted by various investigators, *e. g.*, Schmidt. Especially convincing in this respect are the figures of Peller and of Perles, both based on clinical material observed in Vienna, the city which suffered more from actual starvation than any other large city. Identical results are recorded by Hofmann, who does not limit himself to the study of birth-weight, but also finds all the other characteristics of maturity uninfluenced. In conclusion, he points to the fact that this evident absence of any effect even of excessive undernourishment on the development of the fetus cannot properly be interpreted as conclusive proof of the uselessness of the Prochownik diet. Obviously a restricted war diet differs in many essentials from that outlined by Prochownik. A very valuable contribution on this particular subject comes from Zuntz. By carefully planned experiments on animals he proves anew that even excessive starvation during pregnancy reduces fetal weight only very slightly, but that it leaves entirely uninfluenced the calcium metabolism, which alone is the deciding factor in the possible value of the Prochownik diet for the purpose of avoiding a dystocia in certain cases.

Undernourishment and overexertion by a few writers are held responsible for the increase of abortions, rather generally noticed. Arguing against this theory, some authors are willing to concede that these two factors may have augmented the number of premature labors, and they interpret in this manner the suspected but not proved reduction in the average of birth-weight.

Mayer, a strong believer in the disturbing effect of severe emotions on all functional activities of the female genitalia, is satisfied that a psychic shock can be accepted as an entirely acceptable explanation of an abortion if no other cause is evident. To the same conclusion comes Ebeler in a rather indirect way. He feels that the statements of those of his

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patients who ascribed the spontaneous termination of the pregnancy to a definite emotional insult, in general, must have been correct, because these cases did not exhibit the high percentage of febrility characteristic of criminal abortions. In support of his views he quotes Baudeloque, who reported 92 abortions occurring apparently as the result of the explosion of a powder magazine.

The majority of writers, however, express their full agreement with Fehling, Bumm and others who have demonstrated beyond any reasonable doubt that the total of abortions during the war has been chiefly increased by the appalling frequency of criminal interference both in married and unmarried women. The possible, and indeed probable, relation of an increased number of abortions to the frightful spread of syphilis among all nations is extensively discussed in literature, but it is impossible to include references to this literature in this paper.

In a somewhat unique relation to changes brought on by the War stands a renewed interest in twilight sleep. Helene Stoecker, the leader of the feminist party in Germany, started a most successful agitation for the general employment of some form of anesthesia to render childbirth painless. Women, she claimed, weakened from malnutrition and overwork and unnerved by worry, anxiety and psychic shocks, are neither willing nor fit to stand the agonies of labor. They will have to be assured that they will be spared all suffering. The demand became urgent and universal enough to force German obstetricians to start once more to experiment with twilight sleep. The schematic administration of the scopolamin-morphin combination, as suggested by Siegel, is severely condemned, especially by Feldman and Gruenewald; also by Engelman, who feels that newer observations only confirm the experience of the past, that twilight sleep has its many disadvantages and is not a safe procedure except when practised by experts in hospitals. This alone precludes the general adoption of the method as a routine procedure. Chloroform, carefully given in small doses, remains the only really prac-

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ticable and entirely satisfactory form of pain relief during labor for common use.

But the vigorous support of obstetricians in Germany's active "Bevoelkerungspolitik," *i. e.*, in the diversified and strenuous efforts of increasing her population, was not by any means limited to renewed attempts in relieving labor pains or to devising more extensive (and apparently very successful) welfare actions in the interest both of the pregnant woman and the newborn infant. Scores of papers, most of them thoroughly discussed before medical societies, and at least one large new book (by Winter, published by Urban & Schwarzenberg) deal exhaustively with the various conditions which might justify an artificial interruption of pregnancy. They cannot be quoted here in detail, but the zealous attempt to confine medicinal abortions in future within decidedly narrower limits is most obvious. Similar restrictions are advocated by other writers in regard to tubal sterilization, an operation which nowadays too often is thoughtlessly added to other gynecologic operations simply because the patients are asking for it. From various sources most seriously the suggestion is made that proper legislation should make sterilizing operations and medicinal abortions illegal if not first sanctioned by a special commission. Another problem, which cannot fail to be interesting to American physicians, is the attempt started in various European countries to prohibit the sale of all preventives. Polano, after thorough personal investigation, is convinced that the most common and almost general method of prevention, practised both among the married and unmarried, is coitus reservatus. Therefore, he concludes, no good can come from the prohibition of the sale of preventives. It surely would not increase the number of births but very likely the number of venereal infections. Some of the articles sold for the purpose of preventing pregnancy probably more extensively are employed rather as a means of precluding the transmission of a venereal disease—a point worthy of most serious consideration.

Not all obstetric literature, however, deals exclusively with

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the problems of war. The Abderhalden reaction seems to be losing rapidly much of its former prestige. Frey in a very elaborate monograph states that so far about 200 investigators have contributed a total of about 300 papers to this subject, but that it is still impossible to pass definite judgment whether experimental and clinical experiences so far actually confirm Abderhalden's hypothetical assumptions. Of late many writers have asserted that his theory is incorrect and have denied to the method any practical value for diagnostic purposes. From his own very extensive investigations, given in detail, Frey concludes that (1) Abderhalden's dialization reaction cannot be regarded as a reliable diagnostic criterion for or against pregnancy; (2) the dialization method with the micro-N-determination under certain conditions proves useful in the diagnosis of pregnancy; and (3) the outcome of the reaction is too much dependent upon the temperature at which the serum had been kept up to the time of its use for the reaction. Bar and Ecalle maintain that the clinical benefit so far derived from the numerous and difficult researches in the problem of the serologic diagnosis of pregnancy is mediocre and entirely out of proportion to the efforts made. The various biologic diagnostic tests prove reliable and definite only so late in pregnancy that no complex reaction is any longer required. They consider Abderhalden's test among them as the least trustworthy. It may be mentioned in this connection that an Italian pediatrician, Caronia, records a positive Abderhalden in all newborn infants, at least up to the sixth day of life.

Werner reports satisfactory and encouraging results from the intravenous use of quinin as oxytocic. Following an earlier suggestion of Halban and Koehler he employed a 5 per cent. solution of the easily soluble quinin bihydrochlorid in distilled water which is sterilized by boiling. He injects 10 c.c. of the solution, *i. e.*, one-half gram of the drug intravenously and shortly afterward the same amount intramuscularly. Fairly extensive experience prompts him to claim that while not clearly superior the method seems in no way inferior to pituitrin.

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A new method of treating puerperal septicemia is advocated by Schaefer. In the treatment of streptococcic septicemia neither the antistreptoccic serum nor any of the colloidal silver salts proved of value. Also methylene blue, which had been tried for years, failed in cases of puerperal streptococcic sepsis. Most promising, however, are results obtained by him with a combined administration of the serum and methylene blue. He injects 50 to 60 c.c. of the serum into the thigh, followed in one or two hours by a subcutaneous injection of 0.05 gm. of methylene blue dissolved in 20 c.c. of warm normal salt solution. Under control of the blood for bacteria these injections are repeated daily for several days. Schaefer assumes that the streptococcic serum sensitizes the cocci in the blood against the effect of the methylene blue. The method fell short of expectations only in the cases of disintegration of septic venous thrombi and of general peritonitis. Benthin claims that in the cases of puerperal and gynecologic peritonitis the new method of pouring ether into the peritoneal cavity proves equally as effective as it has been found during its extensive use in war surgery.

This survey of the obstetric literature of the past few years can be fittingly closed with a reference to most noteworthy work done in studying labor in roentgen-ray pictures.

Roentgenographic technic recently has advanced to such a degree that Warnekros, in a large atlas (published by J. F. Bergmann) and in several papers, is able to show the entire process of labor in a series of most remarkable, one might well say, of astonishing pictures. As the result of "direct observation" of the fetus within the uterus, Warnekros claims that the fetus during pregnancy is not in a forced attitude as usually taught. If there are no anomalies of the uterus or the fetus the latter holds his head not in a forced flexion but in a comfortable middle position. The curve of the fetal vertebral column adapts itself to the elliptoid shape of the uterine wall. Also the extremities are flexed only so far as the limited space requires. The fetus changes its position even late in pregnancy. In one instance the fetus was observed to turn com-

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pletely around its long axis in the course of labor. The actual position of the fetal back is dependent upon the mother's stature and is influenced by the tonic condition of the uterine wall. With the beginning of the engagement of the head no further flexion occurs. In breech presentation the effective transmission of the fundus pressure by the vertebral column to the presenting breech cannot be doubted any longer. It would be impossible to quote here further details of the many observations, recorded by Warnekros, especially in regard to various points in the mechanism of the second stage.

Of particular interest, however, is the radical change required in present views concerning the mechanism of the third stage of labor. The detachment of the placenta begins immediately after the expulsion of the fetus, sometimes in the center, sometimes at the edge. A very few contractions suffice to accomplish the complete loosening. We should not any longer speak of a Duncan or Schultze mode of detachment. The common inversion of the ovisac, usually designated the Schultze mode, actually occurs in the vagina.

One may feel some doubt whether these investigations by means of roentgenograms, so far obviously made only on a limited number of cases, have gone far enough to warrant Warnekros' far-reaching deductions. But any doubt is dispelled, if we see that Weibel arrives at the identical conclusions. He claims, and apparently must be conceded, priority in his attempts to photograph the placenta within the uterus. He was entirely successful in 28 cases and states positively, that the placenta, as a rule, is detached by the first two uterine contractions after expulsion of the fetus; that the placenta always passes through the internal os edgewise, and that, therefore, *the mode of expulsion,* Schultze (more properly termed Baudelocque) or Duncan, has absolutely no relation to the *mode of detachment* from the uterine wall.

It seems evident that a new, useful and reliable method now is available for studying and comprehending the mechanism of labor. Older views and theories, if not confirmed by such direct visual observations, will have to be discarded as obsolete.

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In summarizing this review of obstetric literature of the years of war the statement seems well justified that obstetrics has not lagged behind surgery, epidemiology, pathology or any other branch of medicine in the advancement both of theoretical and practical knowledge.

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THE TREATMENT OF SUPPURATING WOUNDS FOLLOWING ABDOMINAL SECTION

By Thomas J. Watkins, M.D.
Chicago, Ill.

Suppuration of wounds should not occur in clean cases. When it is necessary to operate upon an "acute abdomen" a considerable percentage of the wounds will be infected and suppurate. It is seldom necessary to operate upon acute infections in the pelvis until the patient has developed immunity, a fact which was long ago established by gynecologists. (This principle applies to acute infections in most other parts of the body and has only recently been adopted in the treatment of acute infections of the chest.) The wound in these cases should consequently seldom suppurate.

The danger of contamination of the abdominal wound is considerable in cases of cancer of the cervix, especially in advanced cases, which almost invariably have deep-seated infections. There is also considerable danger of infection in cases of hysterectomy when a fibroid polypus protrudes into the vagina.

A considerable difference of opinion exists relative to the length of time which should intervene in acute pelvic infections between the termination of the acute infection and the operation. We believe there is relatively little danger of infection of the wound in these cases when the operation is made a few days after the temperature has become normal and leukocytosis has disappeared—that is, after the patient has developed general immunity to the infection.

The statistics on operation for cancer of the cervix empha-

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size the great importance of thorough cleansing of the vaginal canal and cauterization of the cervix before making abdominal section. In cases of submucous infected polypus we believe it highly important to remove the polypus and to wait about two weeks before making abdominal hysterectomy. We have been disappointed occasionally in the result when the operation was made two or three days after the polypus was removed.

For some years we have used alcohol, as has been advised, rather freely in the peritoneal cavity and abdominal incision in infected and contaminated pelvic cases. It has seemed that this has at times prevented suppuration of the abdominal wound.

The question of the use of drains in cases in which suppuration is anticipated is of interest and value. It has been more or less customary to establish vaginal drainage in some cases, with the hope of protecting the abdominal wound from infection. My experience has been that the use of vaginal drainage for this purpose has been disappointing. It does not protect the abdominal wound from infection, because the drain cannot possibly reverse the current in the bloodvessels and lymphatics and consequently cannot be expected to materially protect the abdominal wound.

TREATMENT. The general principles of treatment of infected abdominal wounds are the same as for wounds in other parts of the body. The author does not claim anything original in the treatment of these cases, but is convinced that the general custom is to overtreat these wounds and consequently to delay repair, to unnecessarily disturb the patient and to impair the strength of the abdominal wall.

Some phases of the general subject of infection and immunity are important to have in mind in the treatment of these wounds, namely, the infection does not long remain localized. Cases of infection which do not suppurate are often quite as acute and prolonged as cases which do suppurate. The presence of pus is therefore not of paramount importance. These wounds heal very slowly as long as fever persists. When the patient's temperature becomes normal the repair of the

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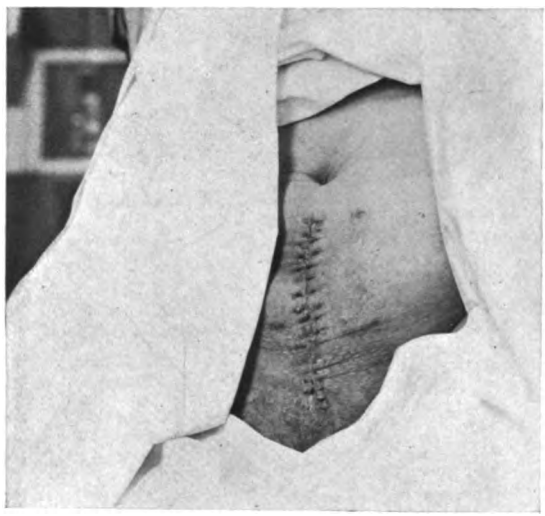

FIG. 1.—Mrs. W. F.

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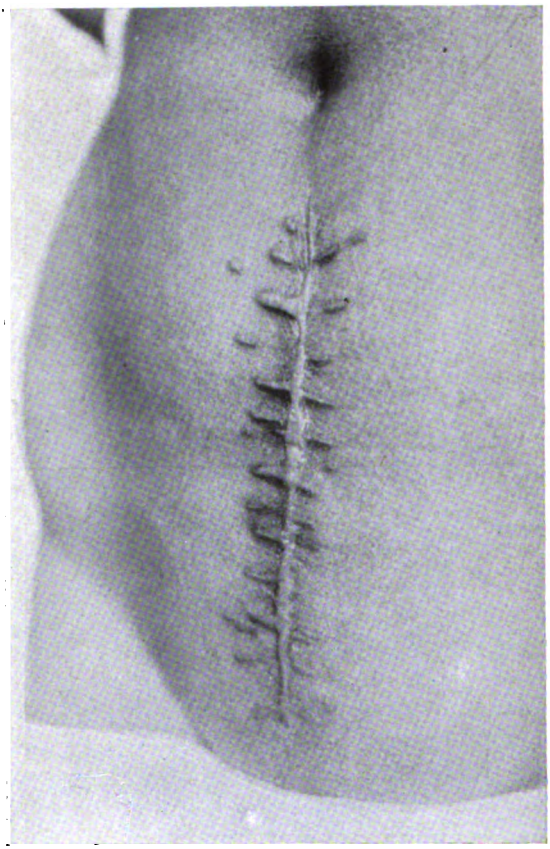

FIG. 2.—Mrs. H. F. L.

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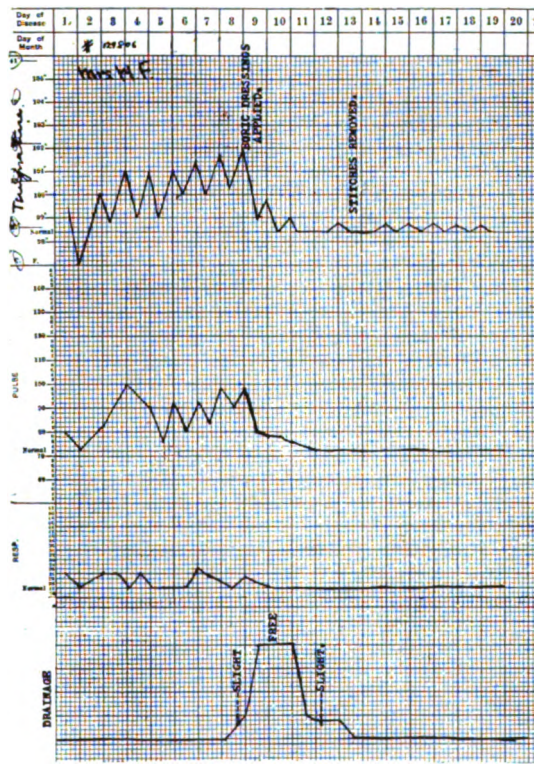

FIG. 3.—Chart for case W. F.

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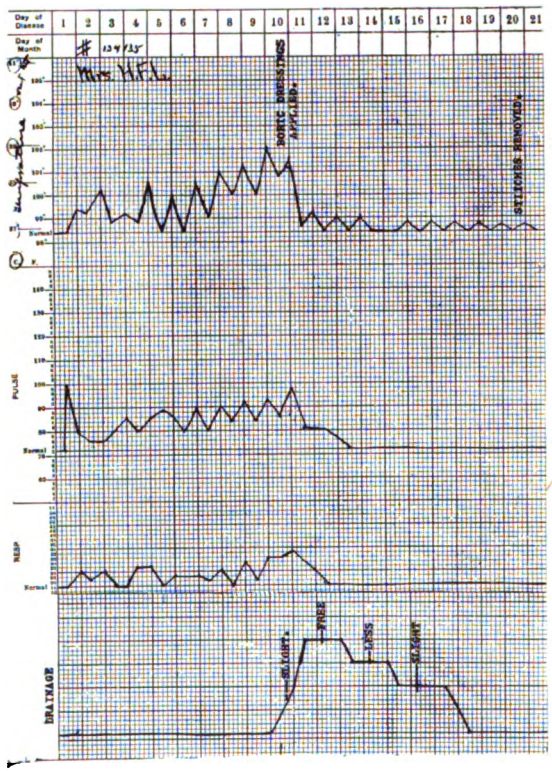

FIG. 4.—Chart for case H. F. L.

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wound rapidly takes place. It is not always possible to estimate the relative importance of the local infection and of the systemic invasion. In many, if not in all, of these cases the treatment of the systemic infection is more important than the direct treatment of the wound. The possible value of spontaneous autovaccination and destruction of the bacteria by their own toxins is worthy of consideration.

The treatment which we use has become considerable of a routine; no sutures are removed until the wound is healed unless it becomes necessary on account of extensive cutting of the sutures into the tissues; no drainage is inserted; no probing is permitted. Moist dressings are kept continuously over the wound as long as it remains reddened or indurated. Care should be exercised, however, not to extensively macerate the parts with moist dressings. The value of moist dressings consists almost entirely in preventing desiccation of the secretions and thus in favoring drainage. A large amount of drainage can efficiently take place through a small opening when thus treated. We generally employ a solution of boric acid for the purpose of preventing decomposition. We have tried some of the newer remedies which were advocated during the period of the War but found them no better than the boric acid dressings. Experiments made a long time ago proved that the use of antiseptics in wounds did more damage to the tissues than injury to the bacteria, that wounds treated without antiseptics recovered more rapidly than when treated with them. Exception may be made to the use of chlorinated solutions in wounds which contain considerable necrotic tissue, a fact which has been well expressed in the writings of Sir Berkeley Moynihan. The use of antiseptics, irrigations and drains materially injures the delicate tissue repair present in healing wounds. We make no exception in cases of infected wounds complicated by intestinal fistulæ. Sinuses indicate the presence of a foreign body or dead tissue; if the suture or ligature material used was catgut no special treatment is necessary. The so-called drains are not necessary, as the wound will drain sufficiently without them. They quite as often interfere with as promote drainage. The experience is

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common that considerable discharge takes place after the so-called drain is removed, which is proof that it has been obstructing drainage. This is often especially true when gauze is used for supposed drainage purposes.

Important features of this treatment of infected abdominal wounds are that no pain is inflicted and that the patient is very little disturbed mentally by the presence of infection, as one can give assurance that the suppuration is of minor importance.

The question of systemic treatment of patients with infected abdominal wounds is not presented for discussion in this paper

We have been treating wounds in this manner for about fifteen years. I read a paper before the Chicago Medical Society in 1907,[1] and the treatment then advocated was practically the same as the one now given. The results have been that the patients almost invariably recovered sooner than they did when we used more energetic treatment. The abdominal wall has almost invariably been as strong as in cases in which no suppuration took place.

A brief report of the following two selected cases well illustrates the results obtained with the above treatment, as they represent the extremes of mild and severe cases:

Mrs. W. F., No. 129,806, was operated upon for an extensive, infected cancer of the cervix. The maximum temperature for seven days was consecutively 100°, 101°, 101°, 101°, 101.4°, 101.6°, 101.8°, and then became normal. The pulse curve varied with the temperature. Wet boric acid dressings were applied, as soon as drainage appeared, which was on the ninth day, and were continued for three days. The drainage was profuse, purulent and offensive, requiring frequent changing of the dressings. The drainage all took place through small openings in the edges of the wound. The sutures were removed on the thirteenth day, which is about the time we generally remove sutures. The patient was discharged from the hospital on the twentieth day. The photograph taken on the fifteenth day after operation (Fig. 1) fails to show any signs

[1] Illinois Medical Journal, September, 1907.

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that suppuration occurred. The patient was examined about one month later and the strength of the abdominal wall was tested by palpation and by sitting exercises, and showed no evidence of having been impaired by the suppuration.

Mrs. H. N. L., No. 134,135, was also operated on for an extensive infected cancer of the cervix. Her temperature was 100.4° on the second postoperative day and reached a maximum of 102° on the ninth day. A slight purulent discharge appeared on the tenth day and became very profuse, purulent and offensive upon the eleventh day. Moist boric acid dressings were applied from the ninth to the thirteenth day. The discharge became slight on the fifteenth day and disappeared on the seventeenth day. The sutures were removed on the twentieth postoperative day. A uterovaginal fistula resulted, which was successfully treated later. The photograph taken the twenty-third day after operation fails to show any indication of the wound having suppurated (Fig. 2). Sitting-up tests, to determine the strength of the abdominal wall, show no evidence of any impairment from the suppuration.

Figs. 3 and 4 illustrate the relations of the temperature to the pulse—fever and suppuration.

SUMMARY. 1. No sutures are removed on account of suppuration.

2. No drains are inserted.

3. No probing is permitted.

4. Wet boric dressings are kept continuously applied until induration and excessive redness of the wound disappear.

5. Experience shows that this treatment secures efficient drainage.

6. No appreciable cavity is present at the site of suppuration when the wound is draining; intra-abdominal and atmospheric pressure keeps the suppurating surfaces in relative apposition.

7. When drainage ceases no open wound exists.

8. Experience extending over fifteen years has demonstrated that with the above treatment the infected wounds have healed in less time, the patients have been much less disturbed and the abdominal wound has been left much stronger than when I employed energetic treatment.

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DISCUSSION

Dr. Thomas Watts Eden, London, England (by invitation). —There are quite a number of points in Dr. Watkins' paper which, it seems to me, are of very great interest. I do not know that I understand the principle on which his treatment is based, and should like to get a clear idea of it. I infer that he attaches a great deal of importance to the question of general systemic infection in the case of infected wounds, and that therefore local treatment need not be very active. While that may be so, one's experience clinically is that when the local condition is relieved the general condition is at once also relieved. For example, if one can relieve tension in a suppurating wound the general condition improves at once. He goes rather on the other plan and tries to relieve systemic infection before he relieves tension in his wounds. I would like to know the scientific basis for that principle.

A general surgical principle concerning which we are all agreed, and all act upon is, that free drainage is necessary for suppurating wounds, and although what he said about the use of antiseptics in wounds may have some justification, I think the experience of war surgery is that infected wounds do not do well unless they are laid freely open, so that they can freely drain and be freely irrigated. There is no doubt about that. All our war wounds did better under free drainage and free irrigation. We ought to apply simple surgical principles to infected abdominal wounds, and it is a departure from principle to leave wounds locked up and not allow free drainage. The treatment we adopt in some cases depends a good deal upon the organism which is present. A simple staphylococcic infection will clear up under very simple treatment. Streptococcic infections are more serious. If you get a bacillus coli infection of the wound you are up against a serious proposition. It is my practice to have a bacteriologic examination made at once of any pus that appears, and a good deal depends upon what we find. In streptococci and bacillus coli infections it is necessary to open up the wound widely. If you do that, and irrigate it freely, it will clean up, and when it cleans up you can resuture it, and that is in my opinion the best treatment to adopt.

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DR. JOSEPH BRETTAUER, New York City.—I agree with Dr. Eden that we should always treat these cases according to the principle of free drainage.

What I was especially interested in and had hoped to hear explained was Dr. Watkins' statement regarding immunization.

DR. JOHN A. MCGLINN, Philadelphia.—Dr. Watkins' analogy between infected and abdominal wounds and acute infections of the chest, which the general surgeon has learned to let alone, is not well drawn, because if there was ever a lot of bunk written about delayed operation, it was in reference to delayed operation in cases of empyemata. The paper of one author shows the advantages of delayed operation in certain cases. He showed that surgeons were operating at certain camps before the patients had empyema at all; they were operating in cases of pneumonia, doing the simple operation of thoracotomy or rib resection and the patients died.

Another consideration is, that the cases which showed a tremendous mortality following operation because the operation had been done at the height of the infection. When the infection began to subside and patients who did not die from the primary infection were operated on a certain percentage of these cases would get well. As they traveled along and the infection became less and less the majority of patients got well after operation, so that the analogy between the earlier drainage of the chest and delayed operations on the chest does not hold in these particular cases. As I see it Dr. Watkins does what nature does for him by drainage and what we have attempted to do early in the treatment of wounds, viz., to establish free drainage, and I am perfectly free to admit in the past the use of antiseptics to sterilize a wound is not of great value, but certainly with the advent of the newer class of antiseptics that does not hold true at the present time.

As Dr. Eden says, free drainage and prompt sterilization will enable us to clean up the wounds and sew them up promptly and get union by primary intention. That has been my experience in these abdominal infections, opening the wounds, establishing free drainage, and sterilizing the wounds with chlorolyptol, which is a chlorinated eucalyptus oil, or with Dakin's oil, or if there is necrotic tissue, with the hypochlorite solution, and either binding the wound up after a bacterial count is made,

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or simply strapping the wound carefully with adhesive plaster, as in this way we are able to get as good results as Dr. Watkins showed and in a shorter space of time. I have had wounds heal absolutely in five days after opening them up and after sterilization and strapping them perfectly with adhesive plaster. I do not see any particular advantage in Dr. Watkins' method if we do not open the whole wound up, and not have a gaping wound with an unsightly scar that can be prevented with the modern antiseptic technic.

DR. CHARLES G. CHILD, JR., New York City.—I shall confine the few remarks I have to make on this subject to two points, one of prophylaxis, and the other of wound closure. It has been my experience that the materials used in the wound closure has a great deal to do with infection. I do not believe absorbable suture material has any place in the closure of abdominal incisions. It is notoriously uncertain in its tensile strength, and predisposes both primarily and secondarily to postoperative hernia. In the second place absorbable material, used as a suture, if it has any advantage at all, it is its absorbability, which is notoriously uncertain, sometimes lasting thirty to forty days in the wounds. An important point in wound closure is that absorbable material, before it can fulfill the vaunted virtue of absorbability, must be converted into a soluble gelatin.

Gelatin is an excellent culture medium upon which bacteria readily grow, especially when backed up by normal tissue secretions. The tissue, when in a normal or approximately normal state, will readily take care of a small amount of infection if the wound has been closed, with not infectable, and this means non-absorbable, suture material, and is free from areas of devitalized tissue. It is a different story when the wound contains many areas of traumatized tissue, and numerous foci of pressure microbes produced by strangulating sutures, such a wound is an easy prey to infection as almost any surgeon's clinical experience will tell him if he will only stop to think. The wound should be closed with non-absorbable material, and it should be non-infective and allow of removal subsequently.

The method I prefer is continuous mattress sutures of silkworm gut or one of its substitutes, both for the peritoneum, fascia and skin, with the ends brought out through the angles of the incision, and these sutures are removed on the tenth to

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the fourteenth day. When I gave up the use of absorbable suture material my percentage of primary wound union immediately jumped from less than 80 to between 96 and 98 per cent., where it has remained since that time. When the wound is once infected, the relief of suture tension and free drainage are the important points.

Dr. Brooke M. Anspach, Philadelphia.—I think I see Dr. Watkins' point in the conservative treatment of infected wounds. There is also much to be said in favor of free drainage, but in the early stage of an infection, unless drainage is very carefully made, much harm may be done. I have more than once thought that a comparatively simple infection was made a serious one by too vigorous treatment. In the early stage, it seems to me, the use of heat in the form of an old-fashioned poultice, will localize the infection. After that, opening up the superficial layers and letting out pus will promote rapid recovery and healing.

There is one thing that has not been mentioned that I have used a couple of times with success in wounds which in spite of drainage and systemic treatment will not heal. I think I have seen good results from the use of vaccines in these cases.

Dr. J. Wesley Bovée, Washington, D. C.—Judging from the many points brought out in the discussion, I would say that we are going back somewhat and reviewing our work.

As to the prophylactic treatment of infection, I think it is important. One case Dr. Watkins presented was of cancer of the cervix. It seems to me, we can easily provide against anything but the rarest infections in this manner by not removing the diseased tissue through the abdominal opening, but by separating it (and not entering the birth canal) from above, and pushing it down through the vulva and removing it in that way after the abdominal wound has been closed. This procedure I have followed since March, 1898, following a paper of Dr. Werder on the treatment of cancer of the uterus which appeared in the *American Journal of Obstetrics and Diseases of Women*, February, 1898. There is no danger of infection of the abdominal wound.

I take exception to the remarks of those who insist that absorbable suture material, such as iodin catgut, properly prepared,

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for closing abdominal wounds, is not the proper thing. I probably do not use in $\frac{1}{10}$ of 1 per cent. of my abdominal cases any non-absorbable suture material in cases in which I have had infection. In those cases in which I expected infection I have followed the plan of closing the peritoneum with a purse-string suture, and deluging the wound with 2 per cent. permanganate solution, suturing it up in layers, closing it with buried sutures, with no suture through the skin at all. In those in which I expected infection I have obtained union, and in those in which I got a slight infection in recent years I thought they were perfectly clean.

Some drainage is an advisable thing. We should be thankful for the opening which has occurred if we have suppuration and some drainage, and by changing the position of the patient, putting the patient on the side, drainage is good.

Dr. Edward Reynolds, Boston.—It seems to me, that some of the difference of opinion that occurs is from lack of discrimination. These are not war wounds. Most of our postoperative suppurations are of very mild degree.

I want to speak of one point, namely, many of them originate from a bit of necrotic tissue somewhere in the wound, and I have for many years employed a proprietary preparation known as enzymol which is made by Fairchild and Company, but which is a digestive ferment. Whenever I get a necrotic wound, I put pressure on it, empty it of its own fluids, pour in a little of the enzymol to fill the wound up, making approximately a 50 per cent. solution, and it is amazing how rapidly the necrosis will leave that wound and leave clean granulations; and many of them close rapidly, almost immediately, afterward. I really think if any of you gentlemen will try enzymol in necrotic wounds you will be surprised at the results you get.

Dr. Henry T. Byford, Chicago.—I have used the enzymol treatment exactly as Dr. Reynolds has suggested in a 33 to 50 per cent. solution. It goes in like a ferret, through the smallest openings, and destroys every bit of the albuminous material without producing any irritation. The pus should be pressed out and the wound be kept moist with it.

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DR. REUBEN PETERSON, Ann Arbor, Michigan.—The treatment recommended by Dr. Watkins is rather startling at first, because it does not agree possibly with what we have been doing with our suppurating wounds. If I understood Dr. Watkins correctly, he wants to stop the opening up of these suppurating wounds, that is, by putting on wet dressings a great many of these wounds will heal up as he says. On the other hand, we want to bear in mind that there are certain infections where this is a dangerous practice, where you get a virulent infection, where there is a large amount of suppurating material deep down. I feel safer under these conditions to go back to our former custom of opening freely so as to get the virulent collections away from the peritoneum as quickly as possible. However, this paper is timely because it will stop opening up widely every wound that suppurates and doing a great deal of damage which can be avoided by the procedure he outlines.

DR. RICHARD R. SMITH, Grand Rapids, Michigan.—A good many years ago we adopted the plan as outlined by Dr. Watkins. We did this gradually, going from the free opening of the wounds to doing very little or nothing. We have found it very satisfactory; we have saved patients a good deal of time in the hospital; we have saved patients the possibility of hernia, and altogether it has been a satisfactory procedure. We do not do exactly as Dr. Watkins does; we do not put on a wet dressing; we look at the wound, and when suppuration seems close to the skin we open up and encourage drainage through a small opening. We put on simple dry dressings, we renew these dressings frequently, and in the vast majority of instances the wounds heal promptly without any undue expenditure of time. We make the same exception in handling these wounds of which Dr. Peterson spoke. When they do not do well we open up freely as we used to do.

DR. THOMAS J. WATKINS, Chicago (closing the discussion).—To economize time I will attempt to reply to the discussions collectively and no individually. I am somewhat at an advantage as I have employed this conservative method and have used the other methods which have been discussed.

After an experience extending over many years with this conservative treatment, the wound has healed in from 25 to 50

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per cent. less time than when I used more radical treatment. Painful and disturbing treatments have been eliminated.

The principles of the general treatment of infections was not included in the paper for lack of time and is not pertinent to the discussion. The rapid general improvement, which Dr. Eden mentioned, which often follows opening an infected wound, is interesting and important. It is, however, not as important as might be inferred, because with the treatment outlined, the rapid change for better is generally as soon and as complete as he has mentioned.

The literature and reports relative to the treatment of infected wounds during the war has failed to add much, if anything, to the treatment of wounds in civil practice. The war wounds were generally contaminated and contained much devitalized tissue. Dr. Frederick A. Besley, of Chicago, who had an extensive overseas service, informs me that he believes that the antiseptic treatment of wounds employed did more harm than good, but that the use of chlorin solutions was of value when wounds contained much devitalized and contaminated tissue. The digestive fluid recommended by Drs. Reynolds and Byford would probably act much in the same way and are possibly of greater value than the chlorin solutions.

I believe the variety of infections should not determine the kind of treatment to any great extent. There would be less objection to active treatment for a staphylococcus infected than for a streptococcus infected wound, because the streptococcus infection is easily disseminated and embolic disturbances readily follow.

The discussion intimates that I do not drain infected wounds. My contention is that the treatment recommended gives efficient drainage. When the dressings are removed and the patient's position changed, the wounds are found well drained. This favorable result does not always obtain when tubes and gauze are inserted for supposed drainage purposes.

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ACIDOSIS IN OPERATIVE SURGERY

A STUDY OF ITS OCCURRENCE DURING OPERATION AND ITS TREATMENT BY GLUCOSE AND GUM ACACIA GIVEN INTRAVENOUSLY

By Lilian K. P. Farrar, M.D.
New York
(By Invitation)

It has long been known to physiologists that there is an alteration of the chemical composition of the blood during states of activity, emotion, starvation, etc. The importance of this alteration has been recognized for several decades in internal medicine, but it has not until recently seemed to play any role in surgery for the reason that here the interest has centered chiefly upon examination of the tissues removed. Pathology is in its rightful place, but physiology has lagged behind. It is of the greatest scientific value that all pathologic specimens should be carefully examined and studied, but it is equally important that the living patient should be as carefully examined and studied before and during the operation as the dead specimen afterward. It is here that the surgeon must call upon the biologic laboratory, for it is not sufficient to have a knowledge of physics and chemistry, but one must have a knowledge of physical and chemical action in the living organism, and it is necessary that one should have a biologic conception of the general metabolism of the body in health to find the cause and remedy when disorganized.

The physiologist and the internest at times approach to one another, but rarely do the surgeon and physiologist come in contact, and yet how much greater the need as the time may

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be all too short for the study of a condition suddenly confronting the surgeon at or immediately following an operation. During the war the government of this country and of others, notably of Great Britain, called upon the physiologists to investigate and find, if possible, remedies for certain surgical problems. A committee was appointed by Great Britain as a "special investigation committee on surgical shock and allied conditions." With such a step forward to making the laboratory and the operating room more intimately associated it would seem that biologic chemistry had come into its proper field if the methods of examination could be shown to be simple, adequate and of practical value.

The development of the theory of acidosis has been a gradual one and chiefly applied to diabetes or nephritis; but its importance in estimating a surgical risk, or its possible value during operation as an indicator of pending shock, is only of recent growth, and it is with the object of ascertaining its value under such conditions, that the present study has been made.

The word acidosis was first used by Naunyn to designate a condition in which certain acetone bodies were excreted in the urine of diabetic patients, but the term has gradually acquired a broader significance until, as defined by Sellard, the essential feature of acidosis is a general impoverishment of the body in bases or in substitutes which generally give rise to bases, so that the body, as a whole, shows some systemic abnormality.

The chemical composition of the blood in health is maintained at nearly constant level by the general metabolism of the body:

A. Energy is produced by—
   1. Carbohydrates, which are base-forming foods.
   2. Fats, which are base-forming foods, but which need carbohydrates for their complete oxidation, otherwise they break down into oxybutyric or beta oxybutyric acid.
   3. Proteids, which are the acid-forming foods of the body.

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B. Elimination is accomplished by—

1. Kidney tubules, excreting mineral acids, urea and nitrogen.
2. Lungs, giving off carbon dioxide and water vapor.
3. Sweat glands.
4. Intestinal tract.

If metabolism is faulty then there may be an accumulation of acid by-products in the body, due either to excessive production or to defective elimination, or both together, and a condition of acidosis results.

If we stop for a moment to consider the regulation of respiration in health the importance of this condition will become evident.

The work in 1905 of Haldane and Priestley on "The Regulation of Lung Ventilation" marked an epoch in our knowledge of the factors controlling respiration and has led to the so-called "New Physiology" and aroused interest in the study of the chemical constituents of the blood. These investigators found that lung ventilation is due to the response of the respiratory center to changes in carbon dioxide tension of alveolar air and arterial blood and not to stimulation of the vagi nerves. For each individual at rest, and under normal atmospheric conditions, the normal alveolar CO_2 pressure appears to be an extraordinarily sharply defined physiologic constant, but a slight rise or fall in the alveolar CO_2 pressure causes a great increase or diminution in the lung ventilation. As CO_2 in watery solution (and the gas CO_2 combines in the tissues with H_2O) becomes like a weak acid by virtue of the H-ion, and dissociates into

$$CO_2+H_2O \rightleftarrows H_2CO_3 \rightleftarrows H+HCO_3$$
$$\downarrow \quad \uparrow$$
$$H+ \quad CO_3$$

it has been thought that the H-ion of the blood which is practically constant (while the CO_2 fluctuates) is the respiratory factor, but later investigators believe that the CO_2 in the blood has an influence not due to H-ions but due possibly to a specific effect of the undissociated CO_2, either directly stimulating the

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respiratory center itself or in increasing its irritability to the H-ions.

The hemoglobin of the blood carries oxygen from the lungs to the tissue cells of the body, and it is from within these tissue cells that carbon dioxide is produced. The exchange of these two gases constitutes the internal cellular respiration.

The tension of arterial blood leaving the lungs is 40 mm. and in the alveoli of the lungs is 80 mm. It is because of the low tension in the arterial blood and the higher partial pressure of carbon dioxide in and around the capillaries that gas is taken up by the bicarbonates in the blood to be given off in the alveoli of the lungs. The bicarbonates of the blood, the so-called "buffer substances" of the blood, are then the carriers of the acid by-products of metabolism to the alveoli of the lungs and constitute the alkali reserve of the body. If the bicarbonates are present in the blood in large amount the combining power of the blood, that is the ability of the bicarbonates to unite with CO_2 is high, hence the CO_2 tension in the blood is low; but if there is a diminution of the bicarbonates the carbon dioxide will accumulate in the tissues and the increased CO_2 tension in the blood will stimulate the respiratory center to increase respiration. If alveolar ventilation is not then obtained a condition of intracellular acidosis results, with serious disturbance to internal respiration.

We may liken lung ventilation to an omnibus line with limited seating capacity. If the buses are full the crowds in the streets stimulate the starters to telephone the central office to increase the number and speed of the buses. If all available omnibuses are in circulation and the crowds still increasing the people must find other ways to return home or the congestion will block the road and overflow into the side streets.

Blood bicarbonate is then the criterion of the acid base balance of the body and its percentage in the blood is a most important factor in surgery. During operation, owing to the increase in acid metabolism and also to the fact that anesthesia affects the liver, which is the regulator of acid by-products, there is a considerable drop in the alkali reserve, but as long

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as there are fixed bases in the blood the elimination of carbon dioxide will continue. If the alkali reserve is high to begin with the drop may not be great enough to cause a severe acidosis. But the "more marked the existent acidosis to begin with the more sensitive is the patient to operative procedures, and the more likely is he to be let down by them into a region of danger."

Lusk proved experimentally that an individual can go without food for a number of days without producing an acidosis, as Nature has time to regulate metabolism by drawing upon the stored bases in the body. But in hemorrhage and shock, where there is a lowered blood volume with either actual loss of blood from the body or with stagnation of blood in the capillaries, the fall in alkali reserve in a very short period of time may be so great that the tissues cannot adjust themselves to the altered metabolism and fail to maintain respiration.

The question naturally arises as to where the loss in bicarbonates occurs, and several ways are possible.

1. By excessive pulmonary ventilation.
2. By acetone bodies in the urine.
3. By organic acids other than acetone bodies.
4. In the tissue cells of the body.

Henderson and Haggard believe that the loss occurs in excessive pulmonary ventilation during anesthesia, and that it is preventable by breathing 7 per cent. carbon dioxide air. Reimann and Bloom, however, have shown that blood-acetone bodies account for 20 to 100 per cent. of the lost bicarbonates (on an average 60 per cent.) and possibly organic acids other than acetone bodies account for an additional amount. Caldwell and Cleveland, of the Presbyterian Hospital, found acetone present in 72 per cent. of cases following operation and diacetic acid in 56 per cent. Morris, in Deaver's clinic, reported 61 per cent. acetonuria in postoperative cases.

It would seem reasonable to conclude that in mild cases without shock or hemorrhage the fall occurs in the first three ways, and in hemorrhage the actual loss of blood from the body would account for an additional loss of bicarbonates; but

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in shock we must look for another cause, for it is here that there is the greatest fall in the alkali reserve.

Cannon showed by his work on soldiers suffering from shock that when blood-pressures were equally reduced, hemorrhage alone was not attended by as great a reduction in alkali reserve as in shock, and, further, that the urine in shock did not show diacetic acid.

The acidosis of shock cases then must, according to this evidence, be due to some other alteration of the blood other than the production of acetone bodies. With the development of shock there is an actual loss to the circulation of a large volume of blood which recent investigation has proved lies not in the large veins of the body but is stagnant in the capillaries, and it is here and in the tissue cells that the carbonates of the blood remain and consequently are out of currency and for this reason are lost to respiration of the tissues.

The increase of sugar in the blood during hemorrhage and shock has been the subject of investigation for a number of years. Shenck found experimentally when hemorrhage was produced after ligation of the liver vessels that there was then an actual decrease in blood sugar, thus pointing to the liver as the source of the increased supply. Tatum states there appears to be a reciprocal relationship between the rise in blood sugar and the fall in alkali reserve in these conditions. This would seem to imply an effort on the part of Nature to supply sugar as the agent to offset the destructive effect of a loss in blood to the tissues of the body.

It is because of this fact that glucose was chosen for the following experiments and also because of its food value:

A large percentage of the glucose normally present in the plasma of the blood (0.08 per cent.) is not combined but circulates free in the blood, and is assimilated in this form without further change. Glucose has a nutritive value of four calories per gram, is non-toxic, diuretic and is readily obtained and easily prepared and kept in stock solution. It is not stored in the tissues, as is salt when given in hypertonic solution; nor is there a danger to other tissues, as in giving large

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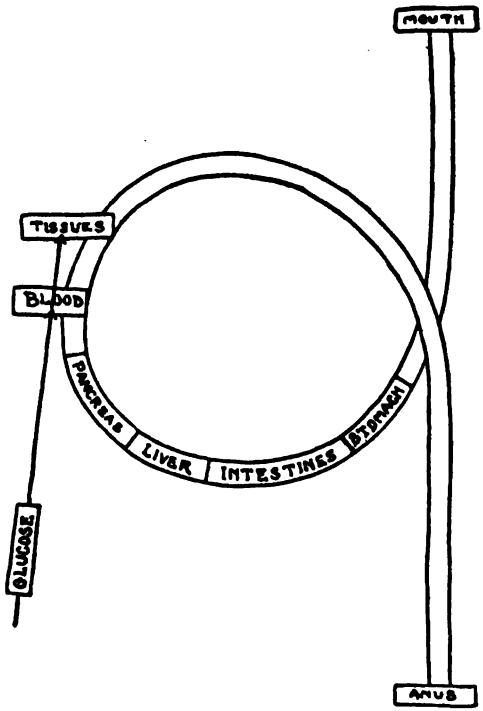
doses of bicarbonate intravenously. Doyon and Duport, in 1901, and Blumenthal, in 1906, discovered that the rate of utilization of sugar by the tissues depended upon the velocity of injection. Woodyatt and his co-workers have proved by actual experimentation that an individual will absorb each hour 0.8 of a gram of glucose for each kilogram of body weight



Glucose is absorbed directly from the blood by the tissues without further metabolism, thus saving the gastro-intestinal tract.

without glycosuria and that the rate can be maintained for hours if desired. Thus a woman weighing 65 kilograms (approximately 150 pounds) would receive 52 grams or 208 calories per hour given intravenously. If given by mouth, subcutaneously, or put into the bowel, Woodyatt says glucose does not pass into the blood faster than an approximate rate of

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1.8 grams an hour at most, which is not sufficient to permit much glucose to escape utilization. The nearest possible approach to a scientifically accurate method of sugar-tolerance measurement must be by direct vascular administration. Each tissue then receives its share in proportion to its vascularity and absorption plays no part, as the liver is not necessary for the utilization of sugar in the blood. If the resting requirement of the patient (of 125 to 150 pounds) is 1800 to 2000 calories per day she will receive in twenty-four hours 4992 calories, or more than double the actual need at rest and sufficient for the loss incurred during heaviest work. In an operation of two to three hours' duration she would receive 400 to 600 calories, or one-fifth to one-third of the total need for metabolism in twenty-four hours. Glucose is not only a food and source of energy but is a stimulant to tissue cells of the body, raising the whole metabolism and thus saving the liver function and restoring glycogen reserves. It increases not only the power of involuntary muscle fiber but has, according to Lusk, a specific effect on the heart muscle itself.

If glucose is to be injected for several hours and the rate of tolerance has been exceeded, or if for any reason it is desired to ascertain the sugar tolerance an examination of the urine one-half hour after the injection has been made will show sugar present in the urine if it is going to be at all. The effect of sugar if the rate has been exceeded is a marked diuresis, and plenty of water should be given to counterbalance this loss of body fluid. If the rate of absorption is adhered to both the danger of dehydration of the tissues on the one hand and of overburdening the heart with too large a volume of fluid will then be avoided.

The solution of glucose was made from C. P. anhydrous dextrose and distilled water. A 20 per cent. solution was used as sufficiently hypertonic to avoid hemolysis, and flasks of 250 c.c. were sterilized in the autoclave and kept in an ice-box near the operating room for emergency cure. Injection is made in the vein of the forearm during the operation and the rate of flow regulated by a stopcock on the tube. The rate is

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easily calculated as follows: If the subject weighs 65 kilograms the rate is 0.8 of a gram per kilogram and the solution 20 per cent. Multiply 0.8 $\times$ 65 $\times$ 5 (*i.e.*, 20 per cent.) equals 260 c.c. per hour; divide 260 c.c. by 60 (minutes) equals 4.3 c.c. per minute, or approximately one flask an hour, to the average patient, more, of course, if the weight is greater.

Woodyatt has devised a volumetric electric pump by means of which the rate and amount can be accurately gauged, but while its desirability is great for hospital work the cost is considerable and any method for arsphenamin injection is satisfactory. The solution should be given at 105° F., and if it is poured into the container at 115°F. and the tubing placed between two hot-water bags the heat will be maintained throughout the administration. An infusion thermometer in the lower end of the tubing ensures an accurate temperature.

While glucose has been used in this series of cases to combat the acidosis incident to operation it has been given in cases of peritonitis and in exhaustive postoperative vomiting to maintain nutrition, and with most beneficial results. There is in such cases a great loss of fluid from the body in addition to what the patient lost during operation, and metabolism fails because Nature cannot utilize the stored protein and fat in the body without water. In such cases an isotonic (5 per cent.) or hypotonic (2 per cent.) solution may be preferable for a time to restore body fluids; but the blood-pressure should be watched that the heart be not overburdened with a large volume of water suddenly injected into the veins, and, generally speaking, the hypertonic solution (15 to 25 per cent.) is preferable intravenously and the Murphy drip 5 per cent. glucose given by rectum or saline subcutaneously until the patient is able to take fluids by mouth. It is in the cases of extreme vomiting, of acidosis, either postoperative or in pregnancy, in peritonitis and in postoperative uremia, where, as Crile says, blood transfusion has no value, that glucose intravenously furnishes the means to combat the condition. It has (as Litchfield found who has used glucose intravenously in pneumonia with excellent results) a beneficial action that

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seems to last beyond the time of injection, due, according to Woodyatt, to the reëstablishment of the oxygen supply caused by improvement of the blood-flow through the part and the resultant diminution of asphyxial acid accumulation.

So far glucose has been spoken of only in relation to a fall in the alkali reserve occurring in an operation without any appreciable degree of shock. We approach now a condition where the most marked changes may occur in a short period of time producing, with or without excessive energy transformation, a condition of intracellular acidosis and consequent disturbance or cessation of the interchange of gases within the cells themselves and resulting in interference with intracellular respiration, which is life itself. The histologic changes in the cells of the brain, liver and adrenals appear within a few hours and indicate the profound alteration produced by this state.

As Cannon has shown by his investigation on cases of shock in the trenches, the fall in alkali reserve in shock (unaccompanied by loss of blood from hemorrhage) goes hand in hand with the fall in blood-pressure. If blood-pressure can be maintained or the fall diminished there must be a saving of the alkali reserve, and to this end gum acacia was added to the solution of glucose in one of the series of cases at the Woman's Hospital, which I will present.

The report of Bayliss, of the special investigation committee on intravenous injection, states that with simple saline solution of any kind the blood-pressure falls to a low level by the end of an hour or so, and the process continues until death. A secondary fall about an hour after injection sometimes occurs in the case of gum solutions, but it is not so low as that with saline at the same period, and is soon recovered from.

Bayliss also states that no solution containing salts alone is of much value, as the rise in blood-pressure is not permanent. An isotonic salt solution is deleterious as the salt solution escapes into the tissues, owing to the diminution of the colloid concentration in the blood and also diminished peripheral resistance in the arterioles and attracts the water from the blood stream after it. A hypertonic salt solution has the same effect after a short initial rise in blood-pressure.

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Sodium bicarbonate given intravenously, which theoretically should be beneficial, has proved clinically dangerous, as Van Slyke has shown, by the excess bicarbonate passing into the tissues. To ensure a satisfactory rise of arterial pressure without necessity of introducing a large volume the presence of a colloid with an osmotic pressure comparable to that of the blood must be used.

Gum acacia (which is. arabinose) is a gum colloid and has been used for shock cases (in 5 to 7 per cent.) in sodium potassium and calcium salt solutions, with beneficial result, in raising blood-pressure. It is a known fact that crystalloids (to which class glucose belongs), when in the blood stream, will attract water from the tissues, and experimentally it has been proved by Erlanger and Gasser that this is the effect when glucose is injected into animals and that gum acacia will then maintain the expanded blood volume. No addition of salt is required in the solution, as the rate of injection is slow enough for the escape of salts into the blood stream.

But before endeavoring to offset the fall in alkali reserve during operation it seemed advisable to find the normal variation in women of the CO_2 combining power of the blood as the percentages given by Van Slyke (52 to 78 c.c. per cent. for 100 c.c. blood plasma) were in men. For this purpose 175 patients were examined on entrance to the Woman's Hospital, and all the examinations of the blood were made by a technician from the Rockefeller Institute by Van Slyke's own method, the principle of which is as follows:

The bicarbonate content of the arterial blood plasma is the most accurate measure of the alkali reserve of the body fluids as a whole. On account of the technical difficulty of taking arterial blood for the examination the determination is made from venous blood with only a difference of a fraction of 1 per cent., as Van Slyke has shown.

After 10 c.c of blood have been drawn into a test-tube containing a few grains of potassium bicarbonate to prevent coagulation (in the usual method for making a Wassermann) and centrifuged the determination of the carbon dioxide cap-

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acity is made. The procedure is relatively simple and requires only four to five minutes to make. Briefly it is the determination of the number of cubic centimeters of carbon dioxide gas which 100 c.c. of blood plasma will take up (*i.e.*, saturating the plasma by blowing into it) at approximately the tension of normal alveolar air (5.6 per cent., which is the end of a deep expiration) and correct for barometric pressure. The result is expressed in volumes per cent. of CO_2.

Chart I

One hundred and seventy-five patients were examined upon entrance into the Woman's Hospital for the CO_2 combining power of the blood (bicarbonate reserve):

45.8 to 50.0	per cent.	6 cases	25 cases
50.0 to 55.0	"	19 "	
55.0 to 60.0	"	60 cases	150 cases
60.0 to 65.0	"	61 "	
65.0 to 69.9	"	29 "	
		175 "	

Eighty-five per cent. of the patients had a CO_2 combining power of the blood between 55 and 70 c.c. per cent.

Of the 6 cases between 45.8 to 50 per cent., 4 cases were of inoperable carcinoma of the cervix with extensive involvement; one was a patient who had had severe hemorrhage and had a hemoglobin of 23 per cent.

The 19 cases between 50 and 55 per cent. included 2 cases of pregnancy, 1 with large fibroids of the uterus and 1 with ovarian cyst; 1 case of pulmonary tuberculosis; 2 of subacute appendicitis; 3 with menorrhagia following abortion. No one of these cases would have been considered clinically to have been more than a fair risk. The other cases were on other divisions and the history not known.

The CO_2 combining power of the blood was then ascertained for 50 patients under fifty years of age with a temperature not

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above 99, pulse below 90 and hemoglobin 85 per cent. or above with the result as follows:

Lowest, 55.2 c.c. per cent.	52 c.c. per cent.	}	Van Slyke's figures for men.
Highest, 68.9 c.c. "	78 c.c. "		

Forty of the 50 patients had a combining power of 60 per cent. c.c. or above.

It would seem, therefore, that the upper limit in women is about 8 points lower than in men (52 to 78), which corresponds to what Van Slyke has estimated, but that the lower limit in women is not so low as in men. As 50 is the figure Van Slyke has put below which an acidosis probably exists, and which seems to hold true clinically for women, this shorter range may mean that acidosis occurs more frequently in women, for we know that acetone bodies are more often found in the urine of women after operation than in men.

CHART II

Condition of subject.	Van Slyke's figures for men. Actual bicarbonate reserve.	Figures for women in the Woman's Hospital, New York.
Normal resting adult, limit of bicarbonate reserve.	Vol. per cent., 53 to 80 per cent.; range 27.	Vol. per cent. 55 to 70 per cent.; range 15.
No pronounced symptoms.	40 to 53 per cent.	50 to 55 per cent.
Moderate to severe acidosis; symptoms may be apparent.	30 to 40 per cent.	45 to 50 per cent.
Severe acidosis; symptoms of acidosis.	Below 30 per cent.	Below 45 per cent.

The shorter range in women is the reason why acetone bodies are more frequent in pre- and post-operative urine. If the upper limit of the CO_2 combining power is lower then the range is shorter and the danger line sooner reached. In 10 of Cannon's series of shock cases operated upon in the trenches the CO_2 capacity before operation was 40 per cent. or less, and in 2 of the cases the capacity fell after operation to 27 and 28 per cent. Cannon states that blood taken from the heart at

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the moment of death from shock has a capacity between 20 and 24 per cent. In the series of cases operated upon in the Woman's Hospital the condition was critical when the patient reached as low as 42 per cent. or 44 per cent., and blood taken from two patients shortly before death was 37 and 28 per cent. This would seem to indicate that in women not only is the CO_2 combining power of the blood plasma not as high as in men but that a critical state is reached earlier in the scale than in men.

Examination of the blood taken at the end of operation was then made in 100 cases to ascertain the fall in alkali reserve incident to the operation. The anesthetic given was nitrous oxide gas and ether by the closed method. Only one bag of gas was used, and the amount of ether varied from 2 to 17½ ounces. The time of anesthetic varied from thirty minutes to three hours fifteen minutes. The operations were gynecologic and included plastic and abdominal work and were done by ten different operators. *One hundred cases examined both before and at the end of operation showed a fall in alkali reserve varying from 0.7 per cent. to 22.2 per cent.*

Austin and Jonas reported a fall in alkali reserve during operation as follows: Lowest 4 and highest 18 volumes per cent.

Reimann and Bloom lowest 5 and highest 15 volumes per cent. Morris, from Deaver's clinic, lowest 0.4 and highest 22.7 volumes per cent.

Cannon on cases operated upon in shock lowest 6 and highest 19 volumes per cent.

Clinically when the fall reached 15 or more points the patient showed symptoms of beginning shock as evidenced by falling blood-pressure, rapid pulse and increased respiration.

CHART III

One hundred cases examined both before and at the end of operation showed a fall in alkali reserve from 0.7 to 22.2 per cent.

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In 14 of the cases the alkali reserve fell 15 (or more points). The incidence of acute acidosis during operation is 14 per cent.

To ascertain the effect of glucose feeding on vomiting, 20 patients were given glucose solution (20 per cent.) intravenously, the amount varying from 24 to 72 grams according to body weight and duration of the operations which lasted from one to three hours (anesthesia). The cases were the most critical of the series, including 2 Wertheim, 4 Mayo, 2 enteroceles, 1 resection of bowel for carcinoma of sigmoid and 3 cases of hemorrhage, 3 large fibroids and 1 large densely adherent intraligamentous cyst. The result was (Chart 4) that the vomiting was entirely absent in 16 cases and nearly so in the other 4 cases, as the amount was only one to two ounces and not more than four times in any case.

During the same period of time 10 cases were operated upon by the same two operators with an anesthesia from 58 minutes to 2 hours 15 minutes on a much less severe class of cases, and only 2 cases had a correspondingly slight amount of vomiting while the other 8 cases vomited from 24 to 59 hours.

CHART IV

The effect of glucose given intravenously upon vomiting.

20 cases given glucose (1 to 3 hours anesthesia).

In 16 cases vomiting was entirely absent.

In 4 cases vomiting was very slight (1 to 3 times).

10 cases not given glucose (1 to 2¼ hours anesthesia).

2 cases had correspondingly slight vomiting.

8 cases vomited 24 to 59 hours.

Vomiting is practically absent when glucose is given intravenously.

A comparison was then made between the fall in alkali reserve, blood-pressure, pulse-pressure, pulse-rate and respiration in 20 cases operated upon without appreciable shock. The duration of operation varied from 51 minutes to 3 hours 6 minutes. The amount of ether used was from 3 ounces to 17 ounces.

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Chart V

Twenty cases operated upon without appreciable shock.

Fall in	Fall in	Change in
Alkali reserve 0.7 to 11.7 per cent.	Blood-pressure 4 to 50 points.	Pulse-pressure same in 4 cases; increased 4 to 20 points in 6 cases; fall 5 to 40 points in 10 cases.

Change in	Change in
Pulse-rate same in 1 case; increased 4 to 40 beats in 14 cases; fell 8 to 26 beats in 5 cases.	Respiration rate same in 10 cases; increased 2 to 10 in 9 cases; lessened 4 in 1 case.

The fall in blood-pressure is a more reliable guide during operation to pending shock than is the alteration in pulse-rate and respiration, inasmuch as it is the cause upon which that alteration depends.

The fall in blood-pressure bears a close relation to the fall in alkali reserve. The change in pulse-rate and respiration is not constant.

The next and final step in the study was to see if blood-pressure could be maintained during hemorrhage or shock. The reports from the British special investigation committee on surgical shock of intravenous injections to replace blood and particularly upon the use of intravenous injection of gum acacia in surgical shock led to the following procedures:

Bayliss, and later Drummond and Taylor, used a 5 to 6 per cent. solution of gum acacia in salt solution of different strength. Believing that beneficial results had been obtained by glucose solution I then added 6 per cent. of gum acacia to the glucose and gave the combined solution. I found later that Erlanger and Gasser have given this same solution, but with a higher percentage of glucose (30 per cent.). Salt or bicarbonate of soda was not added to the solution for the reason, as Erlanger says, that the fluid is introduced so slowly that the water attracted to the blood stream by the crystalloid sugar brings salts with it. Absolutely no harmful result has

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occurred to the patients in any way. Three patients who have been given glucose intravenously for postoperative vomiting, and the rate of injection greatly exceeded, have had mild chills, but no further complication. No patient who has had a solution of glucose or gum glucose during operation where the rate was directly under observation has had a chill.

Technic of Preparation of Gum Glucose Solution

(From the Laboratory of the Woman's Hospital)

6 per cent. gum Arabic.
20 per cent. dextrose.
0.9 per cent. sodium chloride.

Procure gum Arabic, grade A, Kordofan or Egyptian, in powdered form, which will go into solution more readily than the crystalline form. If the gum is in lumps, considerable time will be saved if it is ground before attempting to dissolve it.

C. P. anhydrous dextrose is used for the solution. There are several varieties of "pure" dextrose which are much cheaper, but greater care must be exercised to remove impurities or a heavy deposit will remain after the final sterilization.

For 1 liter of gum glucose solution, weigh out 250 grams c. p. anhydrous dextrose and 60 grams gum Arabic. Suspend the gum in 300 c.c. normal salt solution, stirring until most of the gum has dissolved, and then let stand in a refrigerator overnight to completely dissolve the residue. The following day dissolve the 250 grams of dextrose in sufficient warm salt solution to make a total volume of 625 c.c. and filter through cotton. The excess quantity of solution is necessary to counteract the loss due to the filtration.

Add 500 c.c. of the dextrose solution to the gum solution and mix. Then make up to one liter with normal salt solution. Place in a boiling water-bath for a half hour, stirring frequently. This heating will dissolve the gum completely and will also precipitate out impurities in both gum and dextrose.

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Again make up to 1 liter with normal salt solution. Titrate the reaction and neutralize with 10 per cent. solution sodium carbonate (approximately 15 c.c. of 10 per cent. sodium carbonate solution will be required per liter). This must be done, since the solution has been found to be quite acid (Arabic acid).

Autoclave for fifteen minutes, at 15 pounds' pressure, which will precipitate a quantity of solid matter. Care should be observed to have the solution subjected to the same degree of heat as in the final sterilization, or a clear solution cannot be obtained.

Filter through cotton and then through a Buchner filter, using two layers of linen and two of hard filter paper (Whatman, No. 50), arranged alternately and moistened on the filter with saline solution. (In layering start with linen.) The linen serves as a support for the paper, which otherwise would be sucked through the holes of the funnel under the pressure applied.

Divide into 250 and 300 c.c. lots, which are convenient amounts, and pour into clean sterilized Erlenmeyer flasks and autoclave for fifteen minutes under 15 pounds' pressure. If the solution is clear and free from sediment, it is now ready for use. If the gum glucose solution is not to be given immediately the flasks must be placed in a refrigerator, where the solution will keep for a long time ready for emergency use.

The cases were given 6 per cent. gum acacia and 20 per cent. glucose at subtolerant rate just as previously with the glucose solution. The treatment was given because of the patients showed either a low CO_2 combining power or were frankly bad risks or after hemorrhage. In two cases of 250 and 255 blood-pressure where the solution was not given until the blood-pressure had fallen 100 points, then fell only 10 and 15 points lower, and one hour after operation were above the point where they were when the solution was begun. Two cases where the solution was started late, after severe hemorrhage, and the blood-pressure had dropped 30 to 45 points, were one hour later 10 and 12 points above the blood-pressure

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findings at the beginning of operation. One case of three-hour anesthesia with large densely adherent cyst of the pancreas dropped 12 points. *The other 32 cases were from 2 to 30 points higher at the end of operation and only three of the above cases showed a fall in alkali reserve of 15 points.*

CHART VI

The effect of gum glucose in maintaining blood-pressure after hemorrhage or in prolonged operation in 40 cases (1 to 3 hours anesthesia).

8 cases dropped 1 to 15 points only.

32 cases were the same or from 2 to 30 points higher at the end of operation.

6 per cent. gum acacia in 20 per cent. glucose solution will help to maintain blood-pressure if given throughout an operation.

Before closing mention should be made of other tests for acidosis, the prophylaxis and postoperative treatment of this condition.

While it is believed that Van Slyke's test for the alkali reserve gives the simplest and most accurate means of ascertaining the acid base balance of the body, still an effort should be made, especially when the CO_2 combining power is low, to study the patient from all angles and fortify him against the risks of a surgical operation; and to this end the patient's metabolism and eliminative processes should be determined and an effort made to—

I. *Limit the Production of Acid By-Products.* As acid by-products result from either a deficient supply of carbohydrates or an excess of protein which gives rise to acid-forming elements and thereby depletes the stored bases of the body to neutralize the acids formed, the diet before operation should consist chiefly of starchy foods, together with vegetables and the citric fruits, which are changed to carbonates in the stomach. Shigenoba has shown by experiments that the kind of food has a marked influence upon the acid base equilibrium

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of the organism. Though the carbon dioxide capacity of the plasma is 61 to 64 in green diet this value is reduced to 48 to 53 on protein diet. (The hydrogen ion concentration of the blood remains constant with both kinds of diet Ph. 7.35 to 7.5.)

The postoperative diet should be of the same character, viz., fruit juices or fruit albumin, cereals (not oatmeal), citric fruits, honey, sugar, starchy foods and vegetables. As starvation is a cause of acidosis, food should be given up to a short time before operation and feeding begun early after the operation.

Bicarbonate of soda is of undoubted value in raising the alkali reserve if given for several days preceding the operation.

II. *Increase the Elimination of Acid By-Products.* 1. The Kidney: As the alkalinity of the blood is maintained for the most part by the tubules of the kidney it is of great importance to know its ability to eliminate acid by-products. In health the effete nitrogen of the proteid molecule is used to make ammonia salts and combines to form urea, but with an excess of acids the ammonia is used to neutralize them and consequently escapes conversion into urea. The relation of ammonia nitrogen to total nitrogen in health is about 2 to 7 per cent., but in acidosis it is usually over 10 per cent. and may in severe acidosis rise to 20 to 30 per cent. It is not until all the ammonia is combined that the acetone bodies appear in the urine.

(a) The importance of examining then for their presence is evident, especially in women, who Caldwell found had acetone bodies in 23 per cent. of his cases before operation.

(b) The soda bicarbonate tolerance test of Sellard is a valuable aid in estimating the amount of alkali necessary to render acid urine alkaline. In health 10 to 15 grams of bicarbonate of soda will make the urine alkaline in eight hours, but with an excess of acid in the urine the amount is greatly increased and an estimate may thus be made of the total acidity by the amount of soda bicarbonate required.

(c) The phenolphthalein test, while it shows a wide varia-

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tion, points to a condition of acidosis when the total output in two hours is 30 per cent. or less.

2. The respiratory capacity of the lungs may be further studied by estimating the CO_2 tension in the alveolar air and by the simple test of Yandell Henderson for acidosis, viz., the ability to hold the breath for the normal period of forty seconds.

3. The intestinal tract and the sweat glands of the body should be considered as important factors not only in carrying off waste-products but for the loss of fluid to the body.

Purging shortly before operation and postoperative vomiting remove a large amount of water from the tissues, thus predisposing to acidosis. Patients in the calorimeter eliminate water through skin and lungs (Du Bois) at a rate which varies between ½ and 1 liter a day. In active exercise or nervous excitement the amount is greatly increased. Benedict quotes the case of a foot-ball player who lost 14 pounds in a game one hour and ten minutes long—only ¼ pound was due to the oxidation of solids—13¾ pounds was water lost.

The patient who at the end of operation has saturated the coverings above and below with perspiration greatly needs the addition of fluid which may readily be placed in the bowel (1 to 1½ quarts) while unconscious to offset this loss of fluid to the tissues, and a further addition of fluid, intravenously, subcutaneously or by Murphy drip as the need may be, is an aid to metabolism.

Summary

1. Acidosis is a term used to signify an impoverishment of the body in bases.

2. The alkali reserve (bicarbonates of the blood) is the criterion of the acid-base balance of the body.

3. The determination of the alkali reserve (*i.e.*, the number of cubic centimeters of carbon dioxide gas which 100 c.c. of blood plasma will take up) is readily made by Van Slyke's method.

4. A high CO_2 combining power of the blood is of the

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greatest importance for the maintenance of lung ventilation during operation.

5. The range of the CO_2 combining power of the blood in women (150 cases) is 55.2 c.c. to 69.9 c.c. per 100 c.c. of the blood plasma, or about 8 points lower than Van Slyke found for men.

6. As the range is shorter in women the danger line is sooner reached which accounts for the greater frequency of acidosis following operations in women than in men.

7. The fall in alkali reserve during operation depends not only upon the anesthetic and the duration of the operation but upon the nature of the operation and the occurrence of hemorrhage and shock.

8. The fall in alkali reserve bears a close relation to the fall in blood-pressure and pulse-pressure. If the fall in blood-pressure is prevented there is a saving in alkali reserve.

9. A solution of glucose given intravenously during an operation at the rate of 0.8 gram of glucose for every kilogram of body weight each hour of the operation will lessen the acidosis incident to operation by promoting metabolism, prevent or diminish the vomiting and promote diuresis.

10. Glucose will appear in the urine in ½ hour if the rate has been exceeded.

11. A solution of gum acacia (6 per cent.) in glucose (20 per cent.), if given at a subtolerant rate the entire time of operation, is an aid to the maintainance of blood-pressure.

12. Carbohydrate feeding before and after the operation together with the use of bicarbonate of soda will do much to prevent or lessen acidosis.

Conclusion

Every well-equipped hospital laboratory should have a paid physiologist who could devote his time to the study of problems on the living tissue as the pathologist does on the specimens removed. The study should include the organic regulation as a whole and not individual cells or tissues. Biology would not then be divided into its branches, but would comprise a study

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not only of anatomy and pathology but physiology and biologic pharmocology as well. The problems should be of practical import, alike of value to patient and surgeon. The student should have made known to him the facts of general metabolism and their relation and importance to surgery. This information should not be isolated and scattered but grouped and given as a part of student work preparatory to surgical training.

As we bring a more scientific spirit to surgery we approach to what Haldane terms the humane physiology, for it is only by a study of life that we know the living and can give the sympathy and understanding which is as much a duty as is the technical skill for the true surgeon.

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DISCUSSION

DR. ROLLIN T. WOODYATT, Chicago (by invitation).—I appreciate the honor of being invited to say something on this subject, and would say first, I feel Dr. Farrar's paper is one of the most rationally written papers I have heard on this subject.

There is a great tendency in using means of this sort to group certain conditions under certain clinical names, such as shock acidosis, and so on, without entirely realizing the combination of conditions which may occur in different individuals; that is, one case of shock is not necessarily like another one; hence a clear understanding of the basic principles underlying the use of these agents is important.

Gum acacia glucose and salt are all similar to each other in one respect, as Dr. Farrar has pointed out, in that they all have high hydration capacities and will hold water in combination with themselves. Whether in the bowel or kidney tubules, you will find these substances associated with water and, of course, as they pass into the blood stream they accumulate water in the blood creating the condition of hydremic plethora. Thus they increase blood volume, but these substances also differ in other respects.

An inorganic salt like sodium chlorid, when introduced into the blood, passes rapidly from the blood into the tissue cells, and being non-oxidizable, rapidly reverses the initial hydremic plethora and replaces it with hydrops of the tissues. Glucose differs from salt in the respect that after passing from the blood into the tissues it undergoes utilization (oxidation, storage) but does not accumulate as unchanged glucose in the tissues. Instead of exhibiting the hydrops-producing action of salts in the

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tissues, glucose substitutes for these the beneficial chemical effects which result from its utilization and, as Dr. Farrar has stated, these include the increased storage of glycogen, an increased energy in non-striped muscular fibers and increased tone, so that following glucose injections it is not uncommon to find a marked increase in the tone of the musculature of the alimentary tract from the stomach down, an effect resembling, though not quite so striking, as that of pituitrin. Gum acacia has a certain advantage over salt in that it does not diffuse into the tissues so rapidly. It therefore cannot accumulate in the tissues but remains in the blood and holds water in the place where it is wanted. It has a certain advantage over glucose, owing to the fact that after having been introduced into the blood stream all at one time the supply need not be maintained by continuous injection. It does not take the place of glucose in all respects because it exhibits none of the chemical effects of glucose in the tissues. Therefore, a combination of gum and glucose is a rational procedure.

I personally have not used gum acacia, but have been more concerned with a technic enabling us to sustain the effects of glucose as long as we wanted them by an apparatus which permits the continuance of injection for an indefinite time. Basing my remarks on the use of glucose without gum I would emphasize a point brought out by Dr. Farrar to the effect that the increase in blood-pressure, both in its height and duration, is greater than that obtainable with sodium chlorid. The improvement in the condition of the patient in shock and shock like states, particularly when there has been considerable dehydration, is more marked following glucose injections than after the use of salt solution alone, and with glucose there is no subsequent reversal of the first effect on the blood volume. So far as it goes and while it lasts the effect of the glucose is an unmitigated good. Salt has a transient effect on the blood volume and a doubtful effect on the mean arterial pressure followed often by hydrops.

In cases of resection of the bowel, in certain cases where there has been stenosis of the pylorus with marked dehydration or failure of the body to absorb the water it takes in by the alimentary route, also in cases of "transudate" into the stomach, persistent vomiting with dehydration, fever and starvation, and in several other conditions, we have obtained results with glucose which cannot be obtained by other known means.

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A point which would appear to be of particular interest in relation to the gynecological operating room is the frequency, as you undoubtedly know better than I do, with which in conditions associated with pregnancy that type of acidosis occurs in which the acid accumulation is not due simply to tissue asphyxia, as in shock, but in which it is due to that derangement of metabolism which you see in fasting and in diabetes, namely, acidosis having its origin in the fatty acids and associated with aceto-acetic and beta hydroxy butyric acids in the urine. This type of acidosis is specifically combated by the administration of glucose.

So to attain the best results with intravenous injections, it is desirable to take up in each case the several items—blood-pressure, blood volume, plasma bicarbonate, the water reserve of the body, the degree of starvation, etc., and then to make an intravenous prescription for the individual case, carrying the treatment toward definite ends. Where the main lack is water, use a 3 or 4 per cent. glucose solution; for a shock-like state without dehydration, use a hypertonic solution. If there is a very low bicarbonate reserve, add enough bicarbonate to restore it to normal and make the solution and the rate of its injection fit the case.

Dr. Frederick J. Taussig, St. Louis, Missouri.—I would like to report briefly concerning 2 of my cases of postoperative shock treated by Dr. Erlanger with gum-acacia-glucose solution and included in his report on this subject. Both of them have a certain interest and lesson. The first of these cases was one of a large abdominal tumor, a fibroid, filling the entire abdomen, with an infected ovarian cyst. It was a most difficult operation in a woman whose kidneys were in bad shape, but on the advice of the internist I decided to do this rather hazardous operation. Previously I had gotten in touch with Dr. Erlanger, feeling it was a case suitable for gum-acacia-glucose injections. The blood-pressure within twenty minutes after the operation was begun fell to below 100, the pulse became rapid and imperceptible, and Dr. Erlanger proceeded to inject the solution. As you may know, he uses a stronger solution of gum acacia, 20 to 25 per cent., and a little bit higher glucose also. Within twenty-five minutes the pulse-pressure which had fallen to 3½ mm. and the blood-pressure ranging from 60 systolic to 50 diastolic as regis-

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tered on the apparatus for that purpose rose to 90–65 blood-pressure, and pulse-pressure from 6 to 7 mm. The patient at the time she was removed to her room was in as fair condition as one could ordinarily expect any woman to be after a laparotomy. Unfortunately this patient died of pneumonia twenty-nine days after operation.

The second case is perhaps of greater interest because it points to the importance of the use of these solutions in cases of hemorrhage. A cervical cancer had been removed by a paravaginal operation, and on the second day after operation the patient had a severe hemorrhage. The condition was such that she rapidly became exsanguinated, and as I was unable to attend her just at this time, Dr. Erlanger was communicated with, and he felt it was a case for treatment with blood transfusion. According to the statement of the intern, a resident donor could be obtained within the period of half an hour. Unfortunately this intern was mistaken in his statement, because it was not until three hours later that a donor was found, and by that time the patient was in a dying condition.

The conclusion Dr. Erlanger draws in the cases where a blood transfusion is evidently necessary is that the gum-acacia-glucose solution if injected at once will hold the patient until such time as a donor may be available and will add to the probability of recovery.

Dr. Robert T. Frank, New York City.—My experience with gum-acacia-glucose solution was an acute one. It was in an evacuation hospital, where at one period of the conflict the patients came in with all degrees of shock, due to all possible reasons for producing shock. I include cold, exposure, hemorrhage, infection, starvation, dehydration, and so forth. We at first treated them with salt solution. (I am leaving out the other treatments of shock, only referring to those which are distinctly applicable to this discussion). An order was later issued to use gum acacia with glucose. We were asked to employ quantities varying from 700 to 1000 c.c. Without having any time or opportunity for making a scientific investigation, a large number of men who were in charge of these cases came separately to the conclusion that harm was being done by these injections. We thereupon gradually reduced the amount of injection to a maximum of 400 c.c., and our results were better.

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However, we finally came to the conclusion that transfusion was far superior to any of the artificial sera which had been used. I have exchanged opinions with other men from other organizations who have arrived at the same conclusion.

Dr. Benjamin P. Watson, Toronto, Ontario, Canada.—We have been using the gum acacia solution now for nearly a year. We are fortunate in Toronto in having Dr. Keith who did a great deal of original work for the British Commission during the war, and we have come to replace normal salt solution entirely by gum acacia solution.

Our experience with saline solution in shock and hemorrhage has been that you can raise the blood-pressure at the time, and that blood-pressure would be maintained for two or three hours, then there would be a sudden fall and a beginning state of shock again, requiring a later transfusion. We know that 25 per cent. solution has been used by Dr. Erlanger, and with that percentage we find the blood-pressure can be immediately raised. We had a case of ruptured ectopic pregnancy with the blood-pressure down to 80 or 90 systolic, and then brought it up to 120 systolic during the course of the operation, and that pressure was maintained.

We have had 4 cases where we followed the blood-pressure right through a period of eight or ten days following operation, and in none of these 4 cases did the blood-pressure fall more than 6 points from what it originally reached at the end of the transfusion. To one we gave a second transfusion with the gum acacia. When this is combined with glucose, in certain of these alarming cases the effect is very marvelous.

I will mention one severe case of hyperemesis. The patient came in with a condition of great collapse, a blood-pressure of 90 systolic, and a low pulse-pressure. She was too ill to do anything with. We gave her glucose solution slowly. She had it throughout the whole night. Her condition was so greatly improved, although vomiting continued, that we were able to empty the uterus. The patient ran a very long convalescence; and she required repeated transfusions of glucose; she also was given transfusions of blood. Ultimately she made a complete recovery, and I am perfectly certain the patient never would have survived had we not had this means at hand for treating her.

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One important thing in the gum acacia solution is the method of preparation. A great many bad results have been due to bad preparations of the gum. We must use a pure preparation of the gum acacia if possible, and the preparation of the solution must be carefully made. The water used must be freshly distilled water and the sterilizing of the solution in the autoclave must be carefully done. The solution can be put up in greater strength and kept in the operating room and rapidly diluted at the time when they are to be used.

I think it is most opportune that a subject like this has been brought before a large body of operating surgeons.

Dr. George Gray Ward, Jr., New York City.—The studies we have been making at the Woman's Hospital, as presented to you by Dr. Farrar, have been carried out with difficulty. Dr. Farrar has worked under the greatest handicaps. We found at first that we could not rely on the CO_2 estimations, with the Van Slyke method in our laboratory, in spite of having full-time laboratory men available, because of the great amount of work called for by the routine work of the hospital. For that reason, we obtained a technician from the Rockefeller Institute who made all these investigations so that they would be of unquestionable value.

The gum acacia solution, when we first tried it, was a failure from the fact that it was not properly prepared. It was not until we went to Toronto and saw it used there and got from Dr. Watson the exact technic in the preparation, which requires considerable care and many filtrations, that we had a satisfactory solution. There is no question in my mind as to the value and clinical effect of this method in cases of severe operation. The The patients show remarkable little reaction compared to the other cases, notably in those cases Dr. Farrar spoke of in which a Wertheim operation was done and attended with considerable shock. One of the important things you must understand is that the administration intravenously of gum acacia and glucose is given throughout the operation by a slow method, as pointed out by Dr. Woodyatt, who has devised a special apparatus. Unfortunately this costs three or four hundred dollars, and we could not get one, but we regulated the flow with needles and stop cock as well as possible, giving a slow continuous administration from the commencement of the operation. I think it might make a

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difference in the results if the solution was given very rapidly as one would give an ordinary saline infusion. Perhaps that may account for the differences Dr. Frank observed in the Army where they did not have the time for proper administration, but gave it as one would give the ordinary infusion. The high percentage used in the Army may have made a considerable difference also.

The combined use of gum acacia and glucose, as suggested by Erlanger, is theoretically correct, and from our cases it would seem to be borne out clinically, Our results confirm the findings of Cannon that the blood-pressure is a valuable index as to the CO_2 content, as regards acidosis. Instead of it being necessary to use the Van Slyke method, if we take the blood-pressure throughout the operation, we have all the time an index as to the degree of acidosis, which greatly simplifies the practical study of the problem. We used a bracelet stethoscope for that purpose and had readings taken during these operations.

The point that Dr. Woodyatt made is very important—that glucose energizes the muscle so that the muscle becomes tonic, as it were. This I think is shown in the rather free passage of flatus after the operation in these cases, stimulating the intestinal muscle, and there is also in addition quite a marked diuresis as one would expect.

I wish to confirm the point made by Dr. Watson in severe vomiting. We had that borne out in several of our cases, where we could not relieve the persistent vomiting until we gave glucose intravenously.

DR. GEORGE GELLHORN, St. Louis, Missouri.—Is it possible to increase before operation the alkaline reserve of the organism to such an extent as to prevent acidosis?

DR. J. WESLEY BOVÉE, Washington, D. C.—I wish Dr. Farrar would give us a more definite expression as to the rapidity of the current in this slow process.

DR. JOSEPH B. DE LEE, Chicago.—How often do rigors occur after these administrations?

DR. GEORGE W. KOSMAK, New York City.—The method Dr. Farrar has described is undoubtedly a valuable one, but as a

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matter of practical application, would it be possible to substitute some other point of entry for the glucose?

I have for several years given glucose solutions by rectum after operation in doses from 6 to 8 ounces at intervals of two or three hours and believe I have had better results than with the use of salt solution for that purpose.

I would like to know whether in ordinary practice we cannot substitute the rectal administration of the glucose and whether it would not be of the same value for complications of this kind?

DR. LILIAN K. P. FARRAR, New York City (closing the discussion).—First of all, I want to thank Dr. Woodyatt for coming here and discussing this subject because it is really the physiologist upon whom we must depend to know what to put in a patient's blood.

Dr. Frank spoke about the results obtained in the Army in giving gum acacia intravenously. One must find out exactly what can be put in the blood before one can obtain good results and it is only with the help of the physiologist that this can be done.

One of the speakers said that he had used a 6 per cent. solution of glucose and that he had had only an occasional favorable result with it. I have kept to the 20 per cent. glucose because of Dr. Woodyatt's findings, and have been guided entirely in glucose feedings by his work in the laboratory.

It was found by a special investigation committee of Great Britain which did so much in trying out salt solution in hypertonic strength and bicarbonate of soda which Cannon advocated, that dilution of the blood was not a good thing, and, if long continued, was even harmful, and that there was no especial advantage to be gained by it.

The thing of real importance was to get a solution which corresponded to the viscosity of the blood and that is what 20 per cent. glucose and 6 per cent. gum acacia does.

That brings up the question of rigors and chills. We have not seen any in this series. Two patient's who were given glucose intravenously in the ward for acidosis by an intern who did not appreciate the necessity of keeping to the rate, although he had been told, did have chills, but these were not operative cases. There were absolutely no chills or rigors in the other cases. There has been absolutely no case of infection or necrosis of tissue and we have had no bad results of any description.

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As to the question of putting up the solution in a higher strength and diluting it, a point brought up by Dr. Watson, we find it more convenient to put the solution in flasks of 250 c.c., that means 50 grams to the flask, which is what we can give the average patient in an operation of one hour.

The technic is simple. An apparatus, such as is used for giving salvarsan, is prepared. The stop-cock on the tubing regulates the rate of flow and an infusion thermometer in the tubing indicates the temperature which should be 105° F.

With reference to the question of absorption of the solution by rectum, glucose is not absorbed by the rectum faster than 1.8 gr. per hour. The great value of glucose lies in its introduction into the blood. It is not altered by the liver, it goes into the tissues, and it has a far greater effect than glucose put into the stomach or bowel.

As to the prevention of acidosis, which was spoken of by Dr. Gellhorn, I could not take it up in the limited time at my disposal. It is possible to do a great deal toward prevention of acidosis by proper feeding of the patient beforehand. We can bring the alkali reserve up by giving the patient a protein-free carbohydrate diet, and we can accomplish some good by the administration of bicarbonate of soda before the operation, but the great drop that occurs during the operation cannot be offset unless we do something at that time, and the beneficial effect is then directly upon the tissues themselves just as Dr. Woodyatt has said. Thank you for your kind attention.

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A DEMONSTRATION OF CERTAIN TRANSITION STAGES FROM BENIGN TO MALIGNANT CONDITIONS IN THE OVARY, THE UTERUS AND THE VULVA

By Thomas Watts Eden, M.D.
London, England

(By Invitation)

Ovary. There is no evidence that ovarian cancer ever begins in normal follicles; we can only trace its origin from the epithelium of cysts. Therefore, the cyst is the first departure from the normal, the first step along the path which eventually may lead to cancer.

Pseudomucinous Cysts. Let us consider, first, these common and quite benign growths. Their general structure in the character of their epithelium is shown in Fig. 1. The loculi are simple, *i. e.*, they show no ingrowths, the mode of proliferation of these cysts being of the exogenous or everting type. The single layer of the epithelium is furnished with uniformly small, round basal nuclei.

Fig. 2, from an undoubtedly benign cyst, shows loculi with budding of villous processes growing into the interior (endogenous or inverting form of proliferation). This gives the loculi a more complex character than in Fig. 1. Further, the epithelium is proliferating, the nuclei are irregular in size and are irregularly placed in the cells, and tend to become central instead of basal in position.

Fig. 3 is from a cyst which was clinically benign. The epithelium of the loculi shows abundant irregular, branching villous formations which tend to fill up the spaces. The

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epithelium shows imperfect cell-definition, the outlines of the cell being difficult to trace; the nuclei are quite irregular in size and distribution. That rapid proliferation is occurring is shown by the accumulation of debris from detached cells in the center of the loculis. The stroma is normal and abundant and the outlines of the spaces are well defined.

In Figs. 4 and 5 we have an undoubtedly malignant growth, practically solid in general character. The regular locular formation has disappeared, but some irregular acini are still seen; the amount of stroma is scanty; the epithelium is a mass of solid, tubular and papillary formation. These masses are multinucleated and vacuolated like plasmodium, and they show no true cell divisions. There is much cellular debris in such spaces as remain. Fig. 5 shows the epithelium from the same tumor under a high power.

Papilliferous Cysts. The question whether these cysts really arise in Wolffian relics or in derivatives of the germ epithelium is immaterial for the present purpose.

INTRODUCTION. It has been recognized for a long time that there is no sharp histologic line of demarcation between benign and malignant tissues; many neoplasms occur which histologists regard as suspicious but not definitely malignant; many others occur on the border-line, and some observers would designate them as benign, others as malignant.

The early clinical diagnosis of cancer is of overwhelming importance. Yet early diagnosis is very difficult, because the early stages of cancer are so often unattended by symptoms or attended only by unimportant symptoms.

These difficulties have led observers to endeavor to define conditions which, while not definitely malignant, yet show such a tendency to end in malignancy that they may be regarded as half-way houses; such conditions if they can be detected would be rightly called "precancerous."

This demonstration, as illustrated in the accompanying figures, is the outcome of an attempt to explore the intermediate conditions as they occur in the ovary, the uterus and the vulva, and if possible to bring them into relation with recognizable

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clinical appearances. The positive results are perhaps meager, but the subject is not an easy one, and much further work is required.

Fig. 6, from a cyst of the ovary, shows the formation of solid club-shaped intracystic processes or papillæ, having a well-formed fibrous tissue matrix. The epithelium is a single columnar or cubical layer, closely resembling that seen in the last section. The stroma of many of the papillæ is edematous.

Fig. 7 is a low-power section through an ovary showing small papillary cysts in the hilum, which are nearly filled up with abundant, compound, dendritic papillæ.

Fig. 8 shows a section under a high power through one of the papillary masses. The stroma is abundant and healthy. The epithelium shows great activity; there are many club-shaped and irregular, epithelial processes, due to sporadic proliferation. The cell-layer is irregularly multiple and the nuclei are irregular in size, shape and distribution.

Fig. 9 is from a postmortem specimen of a case which was undoubtedly a papillary cancer. The stroma is scanty; the papillary arrangement is preserved but has become quite irregular. The papillæ are covered with many layers of cells, cubical and polygonal in shape, and of very variable size, the nuclei irregular in size, shape and distribution.

Fig. 10, high power of above, well shows the scantiness of the stroma and the variability in type of the epithelial cells in their nuclei.

These figures show that in both the common types of ovarian cyst, gradual traumatic stages can be demonstrated from innocence to malignancy, so that it is difficult to define any dividing line between them. As it is our rule to remove all ovarian neoplasms as soon as they are clinically required, the detection of precancerous conditions is mainly of interest from the histological standpoint.

We do not know what is the cause of the formation of cystic tumors in the ovary. In the remaining sections we shall be chiefly concerned with the effects upon the tissues of chronic irritation and the first section is for the Fallopian tube.

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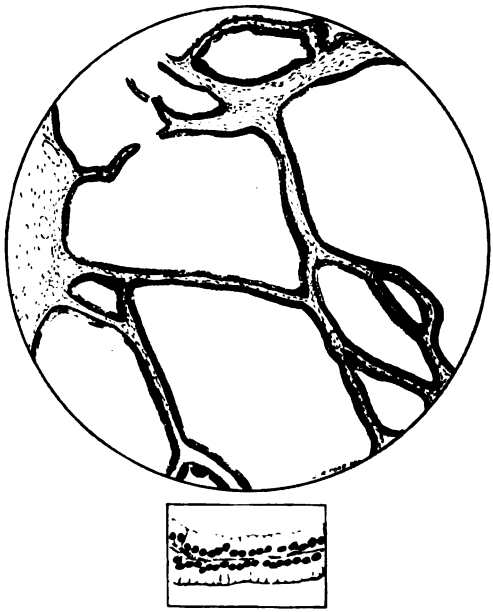

FIG. 1.—Section of pseudomucinous cyst of ovary (× 92), showing general structure (above), and character of epithelium (below) (× 334).

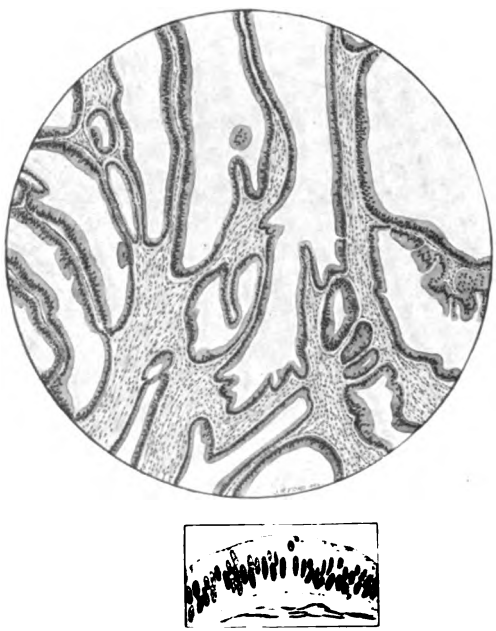

FIG. 2.—Section of benign ovarian cyst (× 92), showing endogenous or inverting form of proliferation. Character of epithelium with irregular nuclei (below) (× 334).

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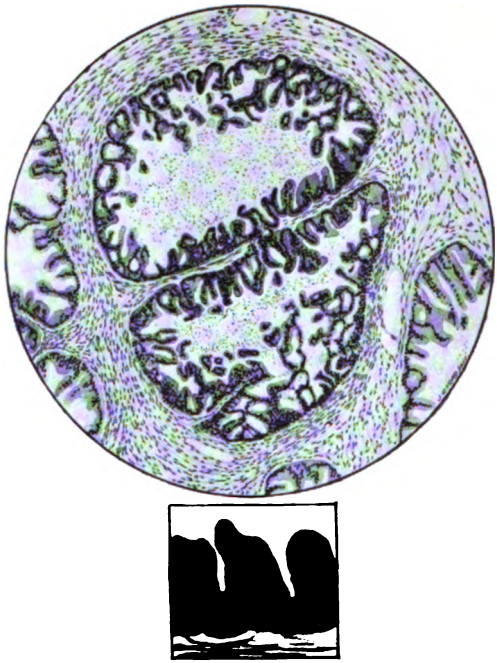

FIG. 3.—Section of ovarian cyst (× 92) clinically benign, showing villous formation of epithelium, tending to fill up the spaces.

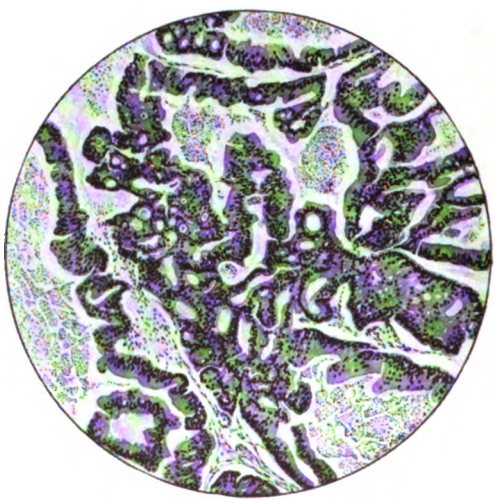

FIG. 4.—Section of undoubted malignant ovarian neoplasm showing practically solid character with loculi disappearing (× 92).

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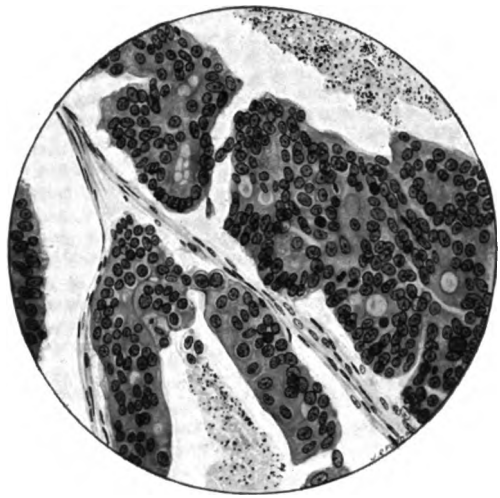

FIG. 5.—Epithelium from section shown in Fig. 4 under high power (× 334).

FIG. 6.—Section of ovarian cyst, showing club-shaped intracystic papillæ (× 30). Cubical epithelium below (× 334).

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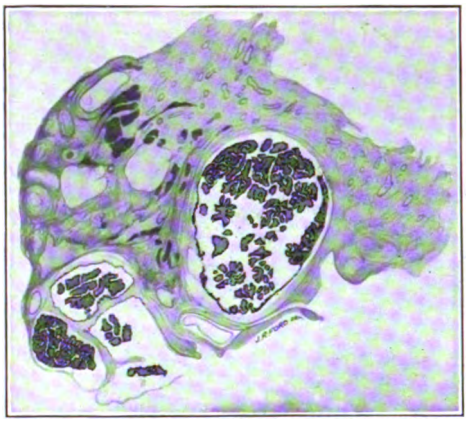

FIG. 7.—Low power section of ovary, showing papillary cysts in hilum.

FIG. 8.—High power section through papillary mass of Fig. 7. Below is shown epithelium (× 334).

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FIG. 9.—Section from an ovarian papillary carcinoma (× 92).

FIG. 10.—High power section of Fig. 9, showing scanty stroma.

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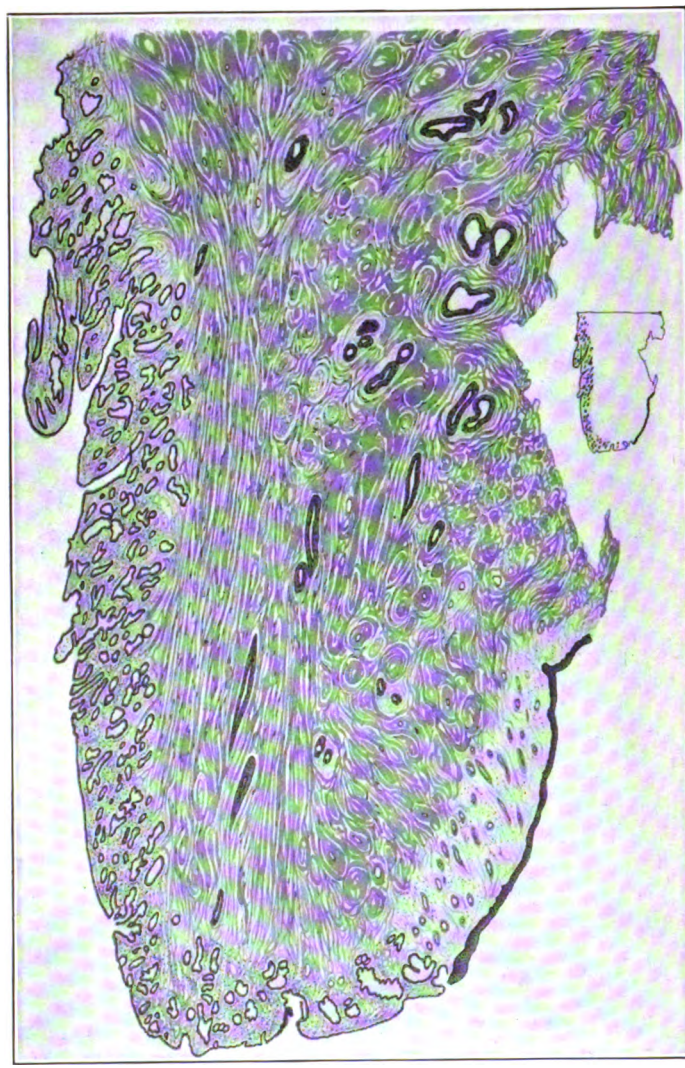

FIG. 11.—Section through lip of cervix, showing erosion. (From Eden and Lockyer, *Gynecology*.)

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FIG. 12.—Section from cervix, showing inflammatory reaction. (From Eden and Lockyer, *Gynecology*.)

FIG. 13.—Section from cervix showing marked glandular proliferation (× 30).

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FIG. 14.—High power of Fig. 13, showing normal cells in a single layer, although benign, is probably forerunner of tubular cancer.

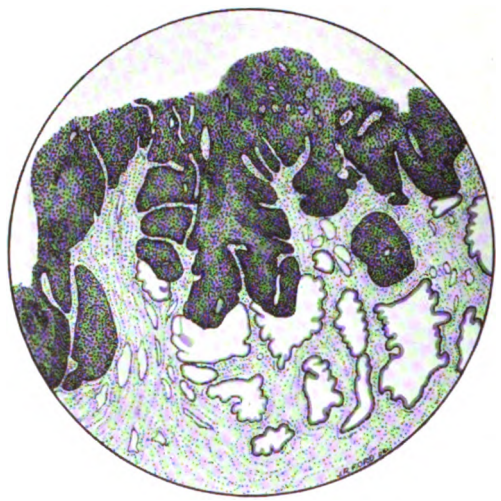

FIG. 15.—Section from edge of cervix, showing marked proliferation of the squamous epithelium.

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FIG. 16.—Section from edge of erosion attacked by cancer.

FIG. 17.—Section showing a squamous and polygonal-celled cancer of vaginal cervix and canal. (From Eden and Lockyer, *Gynecology*.)

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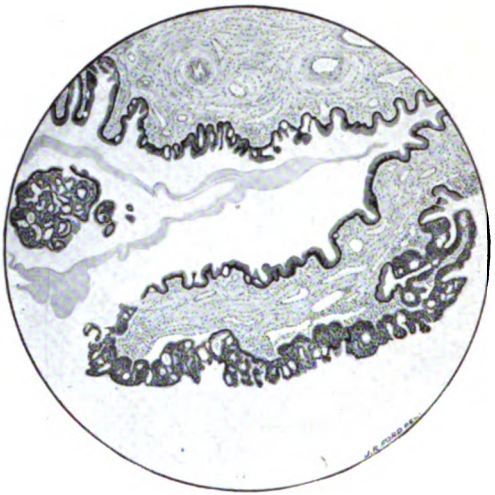

FIG. 18.—Section of a polypoid mucosal adenoma of cervix.

FIG. 19.—High power section of Fig. 18, showing conversion of high columnar into stratified squamous epithelium.

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FIG. 20.—Showing menstrual gland from corpus uteri. (From Eden and Lockyer, *Gynecology*.)

FIG. 21.—Showing benign cystic glandular hyperplasia of corpus uteri (× 60).

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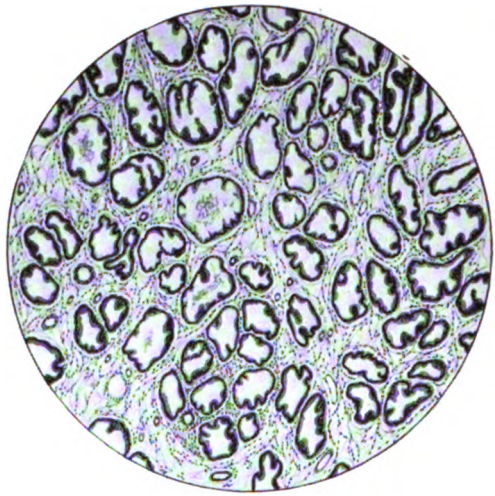

FIG. 22.—Showing benign glandular hyperplasia (× 65).

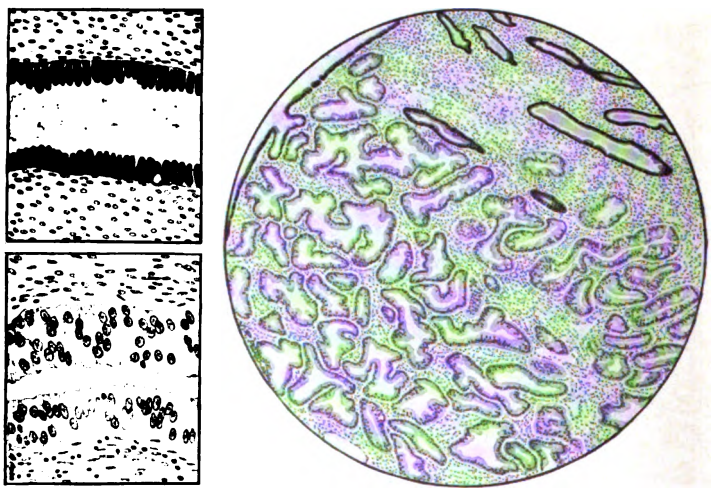

FIG. 23.—Showing atypical benign adenoma of the corpus (× 60) (above), and character of the epithelium (below) (× 240).

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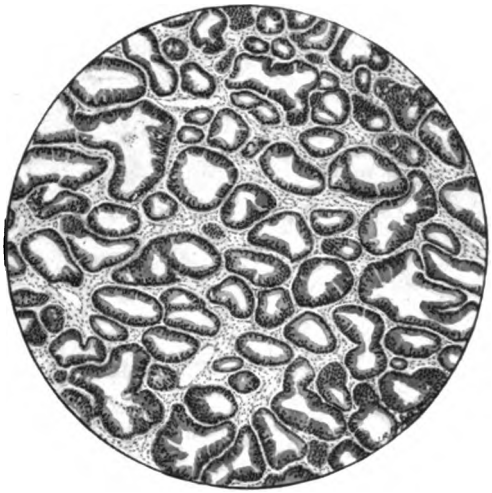

FIG. 24.—Section of columnar-celled cancer (× 80).

FIG. 25.—Section showing edge of a papillary cancer of the endometrium (× 60).

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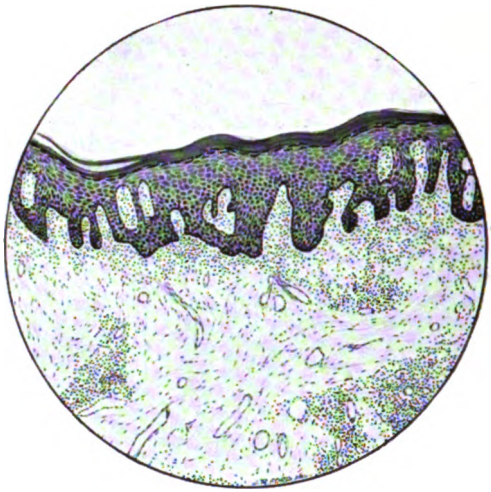

FIG. 26.—Section from a case of leukoplacia, showing epithelial proliferation and inflammatory changes.

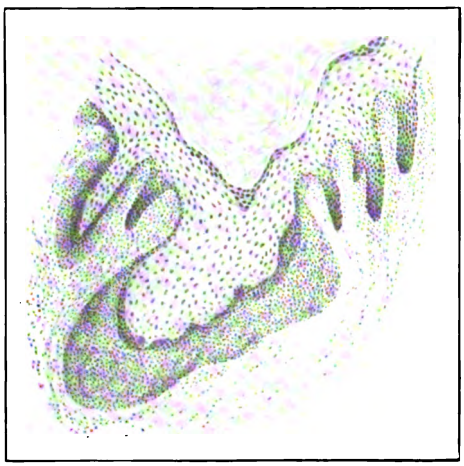

FIG. 27.—Section from a case of pruritus with chronic vulvitis (× 65). (From Eden and Lockyer, *Gynecology*.)

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FIG. 28.—Section showing ulcerated area from leukoplacia, but with no approach to malignancy.

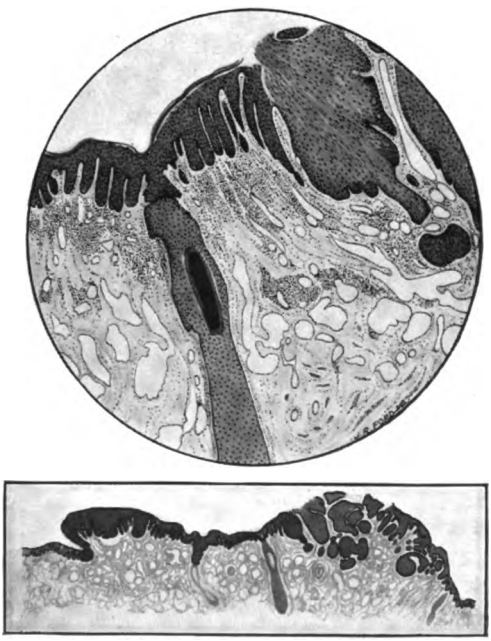

FIG. 29.—Low power section through a cancerous area, showing leukoplacic changes at the margin. High power below (× 592) through edge of cancer.

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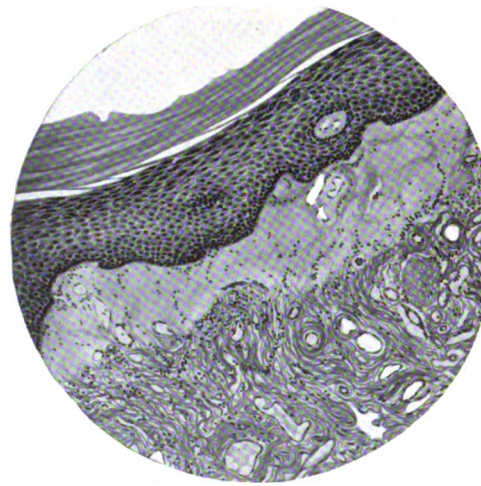

FIG. 30.—Showing a healing leukoplacia (× 70).

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CERVIX. Fig. 11 (taken from Eden and Lockyear's *Gynecology)* is a section through the wall of a cervix showing an "erosion" covering the whole of the free edge of the cervical lip.

The mucous membrane lining the cervical canal is very thick and abundantly supplied with branching glands; many of these open by wide mouths upon the surface and others show dilatation of their deeper parts. The identity of the mucous membrane lining the cervical canal and that covering the area of erosion is quite clear.

The stratified epithelial covering of the outer wall of the portio vaginalis is normal; note that its deep surface forms a slightly wavy line, the intrapapillary processes being only slightly marked. Where it joins the edge of the "erosion" the stratified epithelial layer is a little undermined by the wide mouth of a gland.

In Fig. 12 the stratified epithelial layer is fairly normal. Beneath it is a deep zone of intense round-celled infiltration; in this zone is also seen a dilated gland lined with columnar epithelium, showing the two changes in combination, glandular epithelial activity, with early inflammatory changes.

In Fig. 13 is shown to the right, normal stratified epithelium gradually tailing off to the left to end in a denuded surface; intense leukocytic infiltration of stroma under the denuded surface and around many of the glands. Stroma contains actively proliferating glands, some dilated, others not; the type of proliferation is the inverting or papillary type in parts, in others the ordinary everting type.

In Fig. 14 the epithelium is a single layer and the cells are of normal type. The condition is therefore benign, but is probably the forerunner of tubular cancer of the cervix.

Fig. 15 shows the edge of the cervical lip. The surface epithelium is greatly thickened and actively proliferating; there are broad, branching, intrapapillary processes dipping down into the stroma, some of which are seen in section as islets. Others are penetrating the gland spaces, and are possibly solid processes traveling along the gland ducts. (This is suggested by the corkscrew arrangement.) There is slight

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leukocytic infiltration. The condition cannot be definitely classed as either benign or carcinomatous, but would no doubt have terminated as cancer, *i. e.*, it is precancerous.

In Fig. 16 is shown to the left a normal stratified squamous epithelium. Beyond this the epithelial surface is broken by the mouths of glandular spaces; these are lined in parts by stratified squamous epithelium, in parts by typical columnar epithelium. The former show short papillary down-growths; beyond the mouth of the second gland the surface is again seen to be formed by an atypical stratified squamous epithelium, with short papillary down-growths. Beyond this is a normal gland. There is marked leukocytic infiltration in places. In the stroma is a dilated gland tube which shows inverting papillary processes, one of which is composed of stratified squamous epithelium. Where the stratified epithelium is in relation to the gland tubes its type of proliferation is quite atypical; this is probably a metaplastic change, the columnar epithelium becoming stratified squamous.

In Fig. 17 the section is through the edge of an erosion which has been attacked by cancer.

The left half shows on the surface a thickened stratified layer, with thick epithelial down-growths, some appearing as islands surrounded by stroma.

The right half is recognizable as the seat of an erosion from the general contour of the surface, and the wide compound gland tubules which open on it, beneath this part of the surface is a dilated gland space. Both the surface and the gland spaces are covered and lined with greatly thickened epithelium of stratified type, which also has invaded the stroma beyond the limit of the section. The change appears to have affected both types of epithelium pretty equally.

In benign conditions we have seen that the two types of epithelium readily replace one another, *e. g.*, in the formation of an erosion, and in its subsequent healing. The same transition is seen in cancer affecting the cervix.

Cervical Polypus With Early Cancer. Fig. 18 is a section showing a part of a polypoid mucosal adenoma of the

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cervix; on one surface the typical columnar has been largely replaced by a stratified squamous epithelium. The latter is actively proliferating, showing surface papillary projections and down-growths into the stroma. The conversion of high columnar epithelium into stratified squamous is well shown in the high-power slide (Fig. 19) where the stratified squamous processes appear to originate from the basement membrane of the columnar epithelium covering the surface and lining the gland.

CORPUS UTERI. In Fig. 20 is shown the menstrual gland with budding of glandular epithelium, swelling of stroma cells and distention of capillaries.

Fig. 21 shows an example of benign cystic glandular hyperplasia. The gland tubes are irrgularly dilated, tortuous, with considerable intratubular papillary proliferation. Cells are of normal type nuclei, being regularly arranged.

Fig. 22 is from curettings obtained from a case of benign glandular hyperplasia. Gland tubules are numerous, little dilated and in places somewhat closely packed; atypical epithelial proliferation is very free. There are short, irregular papillary projections into many of the gland tubes.

Fig. 23 is a section from the edge of an atypical benign sessile localized adenoma of the corpus uteri. To the right is seen a normal endometrium with simple straight tubules. To the left are seen numerous closely packed tubules, varying greatly in shape; the columnar cells lining them have their nuclei at varying levels; in many places the cells are in more than one layer. This point is best seen in the high power. The upper layers are from the normal endometrium, the lower layers from the adenoma. In a curetting, very probably, the pathologist would return this as carcinoma; it is no doubt precancerous.

The next section (Fig. 24) is a curetting taken from a relatively normal (*i. e.,* benign) area of a tubular columnar celled cancer. The uterus was removed and a diffuse cancer of the endometrium was found; the area shown is similar to that in the last slide. Yet this was from the general point of view an

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undoubted cancer, while the former from the general point of view was undoubtedly benign.

In Fig. 25 is shown the edge of a papillary cancer of the endometrium. To the left is seen the normal postclimacteric endometrium: the mucosa is narrow, the gland tubes are scanty and the stroma fibrous. To the right are seen irregular closely packed spaces and papillary processes; the former are in places lined by a columnar epithelium, with markedly irregularly arranged nuclei, in places filled by solid masses of polygonal cells; the latter are covered by cells of similar type, often in many layers. The scanty stroma shows leukocytic infiltration.

VULVA. Fig. 26 is a section from a case of leukoplakia. The horny layer is moderately thickened and stratified; the subjacent epidermal layer is greatly thickened, showing broad, irregular, deep interpapillary processes, with simple branchings or divisions; beneath the epithelial layer the dermis shows marked leukocyte infiltration. By fusion of epithelial branches islands of the dermis have been isolated. Epithelial proliferation and inflammatory changes are thus seen together.

Fig. 27 is a section from a case of pruritus with chronic vulvitis showing a similar condition under a high power. The horny layer is not well marked. The epidermal layer has the general characters seen in the last section. There is a very acute leukocytic infiltration around the bases of the interpapillary epithelial processes (high power), indicating marked irritation.

In Fig. 28 the interpapillary epithelial processes are deep and irregular. The horny layer is absent and over a large area it has been replaced by inflammatory exudate; the whole epithelial layer is comparatively thin, but the ulceration has not penetrated through it completely. The dermis is extremely vascular and shows leukocytic infiltration. There is no approach to malignancy as a result of the ulceration.

Fig. 29 is a low-power section through the cancerous area showing the leukoplakic changes at the extreme margin. Solid masses of epithelium have grown down for a considerable dis-

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tance into the dermis; they are quite irregular in shape and are evidently fusing with one another. The surface is broken on the summit of the cancerous area (ulceration). The high-power is through the edge of the cancer. On the left are the leukoplakic changes seen in the previous section; down the center of the field is a hair follicle; to the right are epithelial processes definitely cancerous, invading the dermis and subdermal tissues to a considerable depth. In this case an enlarged inguinal gland was removed which was definitely cancerous, thus confirming the diagnosis.

Fig. 30 is taken from a case of healing leukoplakia. The horny layer is very thick and stratified. The epithelial layer is also very thick but the interpapillary processes are less pronounced. This is due partly to fibrosis of the papillæ and partly to diminished epithelial activity. Beneath the epithelial layer is a well-marked zone of hyaline degeneration of the dermis; this zone has replaced the zone of leukocytic infiltration seen in the previous section.

Conclusions. 1. It must be admitted that, speaking generally, the transition from benign to malignant histologic characters is so gradual that it is very difficult to define a stage which can usefully be called "precancerous."

2. In the case of the ovary the detection of precancerous conditions is not of great practical importance if the rule is observed that all ovarian neoplasms should be removed as soon as they are detected. There is clear evidence that cancer occurs, as a rule, in an ovarian cyst, not in an unaltered ovary.

3. In the case of the uterine body we hold that the condition shown in Fig. 23 is precancerous, and such appearances, or any closely resembling them, should form an indication for panhysterectomy. The outstanding feature is the abundant atypical proliferation of gland tubules and of the epithelium lining these tubules.

4. In the case of the cervix there is clear evidence that an erosion may heal, the columnar epithelium and glands being replaced by stratified squamous epithelium; this may occur either under treatment or spontaneously. In other cases the

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erosion becomes the seat of a cancer, and, as far as we have seen, this is of the squamous-celled type. It will probably become in time established that it is the erosion which is accompanied by deep cervical laceration, by thickening and eversion of the lips of the cervix, and histologically by abundant round-celled infiltration which is most liable to become cancerous. The form which occurs in nulliparous women is probably more benign. We therefore think that old standing cervical laceration with thickened and everted erosions should be regarded as precancerous and should be dealt with by free local excision. A radical operation is not called for in this condition.

5. Cervical adenomatous polypi may become also malignant, but we have been unable, in the case of these very common neoplasms, to find anything that could be called a precancerous stage; early removal is the universal practice, and the point is therefore not of great clinical importance.

6. With regard to the vulva, we hold that chronic vulvitis is, generally speaking, not precancerous. Leukoplakia, like cervical erosion, may heal under treatment or may go on to the formation of squamous-celled cancer. A leukoplakia which is accompanied by enlargement of the inguinal glands is precancerous and should be treated by free excision of vulva and the glands.

We have seen three cases of glycosuric vulvitis which developed cancer, and we suggest that this form of vulvitis may prove to be specially prone to be followed by cancer; further evidence is, in the meantime, required on this point.

We have found no evidence that gonorrheal warts show the least tendency to become malignant.

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DISCUSSION

DR. ROBERT T. FRANK, New York City.—Dr. Eden has given us a very beautiful exposition of the transitional stages from non-malignant to malignant conditions which can be observed in the ovary, in the uterus, cervix and vulva. If to these he had added the inflammatory conditions of the tube with carcinoma following, and the sequence which we see in pregnancy, normal placenta, hydatid mole, chorio-epithelioma, he would have given us an absolutely complete view of the difficulties which confront the pathologist and secondarily also the clinician.

I cannot differ in a single word with what he has placed before you. His position is in marked contrast, for example, with that of a gentleman who recently published an article on the precancerous uterus in which, for instance, he quotes a case of chronic endometritis which he regards as adenomatous and says this woman five years later developed cancer of the uterus. In a similar way he quotes a case of cervical polypi, followed in eight years by carcinoma.[1] If you are willing to extend the term precancerous to a period of time such as that, I am unable to follow you either in conception or in argument.

As Dr. Eden has said, leukoplakia of the vulva or vagina is distinctly precancerous. Whether erosion can be explained from an inflammatory point of view or should be regarded as an adenoma, or at times be classified as a precancerous condition, I am unwilling to say. But the question I desire to ask most emphatically is this: Are we going to do more harm in operating upon the say so of a radical pathologist, or by watching and waiting if our clinical judgment in extremely doubtful cases restrains us? I am proud to say, in several instances I have been able to save the uterus and other parts of the genital tract from unnecessary mutilation where on slender evidence, such as Dr. Eden would reject, pathologists have advocated radical operations for epithelial overgrowth, for specific erosion, etc. I believe with an operative mortality from radical operation of at least 10 per cent. or more, less harm will come in watching these cases with sane clinical judgment backed up thoroughly by good pathology.

[1] McCann, F. J.: The Precancerous Uterus, Proc. Roy. Soc. Med., London, 1919, xiii, Sect. Obst. and Gynec., 3.

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The exposition you have heard of these transitional stages was most beautiful and illuminating.

DR. HOWARD C. TAYLOR, New York City.—I am sure we all appreciate the beautiful pictures which Dr. Eden has shown us on this subject, which is a rather difficult one for one to discuss who is doing work largely clinical and comparatively little of work in the laboratory. When Dr. Eden left out the word precancerous he took out most of my discussion.

A short time ago I had an opportunity to talk with a man who has one of the largest clinical laboratories in New York, a man who is doing extensive work for the best men and who made the statement that physicians at the present time were relying too largely on clinical findings. In fact, he said, at times he was afraid to send out a report of a case in accordance with the findings, and he called attention to the question of precancerous lesions.

In talking with Dr. Stone who read a paper two or three years ago before this Society on precancerous lesions, he stated he had come in contact with a man who, as a result of reading his paper, was doing hysterectomy on account of irritated cervices with the idea that it was a precancerous lesion. The head of the laboratory in New York made that same point: that if he turned out a report that a certain condition showed a precancerous lesion to a certain type of man, that man would be liable to do an extensive operation on that diagnosis which, of course, was the right thing for the patient, but was not intended by the laboratory worker.

We all know how discouraging the cancer problem is. If a case of cancer comes into our hands early, we can hope for operative cure. There is no doubt a great deal of good work can be done by the proper treatment of these so-called precancerous conditions.

The word precancerous is an old word which has recently crept into clinical work and is much misunderstood. As it is used and intended by Dr. Eden, it is different from the meaning applied to it clinically.

As Dr. Eden has said, so far as the ovary is concerned, very little can be done. When we make our diagnosis it means ordinarily that the organ has been removed and nothing more can be done in regard to that.

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I think the word precancerous as it is used by some men and some laboratory men brings out a point that it is a condition which is somewhat in dispute. One pathologist will say that the lesion is benign and another will say it is malignant; in other words, it is a sort of half-way house between the two conditions. With a condition of that sort it is difficult for the clinican to know what to do. As a matter of fact, we are prompted to decide very largely on the clinical findings (influenced by the age of the patient, by her symptoms, and so on), rather than on the pathological report.

So far as the cervix is concerned, I think it is undoubtedly true, as Dr. Eden has stated, that it is the lacerated cervix with erosion in the multiparous woman rather than in a nulliparous woman that is the cause of the trouble. It is more of a precancerous lesion. That, however, is a very close decision to make in the case of a woman who is at or near the cancer age and, it seems to me, the only practical way of treating these cases is to go on the basis that any lesion in that organ or neighborhood should be healed, and that ordinarily means removal by operation rather than by applications of caustics or cauterization.

Dr. Frederick J. Taussig, St. Louis, Missouri.—I wish to confine my remarks solely to the question of precancerous conditions of the vulva. Some four years ago I presented before this Society a short report upon an etiological study of vulvar cancer which dealt in some degree with this question. Since that time I have had occasion to have quite a considerable amount of additional material come to me for microscopic study, and I have recently made a report of 20 cases of leukoplakic vulvitis, and 27 cases of vulvar carcinoma from which I believe certain deductions can be drawn. Prior to this study I made an analysis of 100 cases of normal involution of the vulva in old women. Rather to my surprise, I found that in about 20 per cent. of these old women, with an average age of sixty-five, there was a complete obliteration of the labial folds and the clitoris was practically absent; therefore, the emphasis that has been laid upon such an obliteration on the past in the term kraurosis is not to my mind justified. Berkeley and Bonney have been working on this subject and their views are extensively presented in Dr. Eden's very interesting and complete three-volume work on gynecology. These men have really gone into

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the subject better than any other previous investigators, and their views are practically identical with what I have found. Kraurosis is a different thing from leukoplakic vulvitis. It is an obliteration of the labial folds and clitoris with at times some abrasions, but not having that essential histological factor, namely, the absence of elastic tissue in the dermis. Leukoplakic vulvitis is an interesting and unusual histopathological condition, for besides the changes Dr. Eden has mentioned in the epidermis, I believe even more important are the changes in the dermis itself. In none of the cases I have studied was the absence of elastic tissue from the upper layers of the dermis noted, and in discussing the matter with Dr. Engman, our dermatologist, he was also convinced of the fact that this absence of elastic tissue was the primary factor in the condition, probably in some degree secondary to the absence of corpus luteum because all these cases were in women past the menopause or practically all of them. As a result of the absence of elastic tissue there occurred a greater friability of the tissues, an increased tendency to slight breaks, and from the epidermis cracking, the infecting organisms connected with the infection gain entrance from without and a pruritus begins and the process grows exceedingly worse; the epidermis becomes thickened; we see a picture such as Dr. Eden showed in one of his slides with prolongations, and in that stage the tendency to carcinoma is, of course, greater than in any other. I do not think, however, that Dr. Eden is justified in assuming that the last picture shown, where there was a glairy appearance of the dermis, is a stage of healing. I presented before this Society four years ago a similar slide of a section where the epithelium was thinned out but the dermis showed that malignancy was developing. Therefore, such malignancy can occur in this later stage, although not as frequently as in the proliferating stage.

Dr. John G. Clark, Philadelphia.—The excellent slides which Dr. Eden has presented demonstrate the difficulty of really establishing the exact phase of pathologic change which marks the transition of benign into malignant processes. Thus far we have no data which makes it possible to establish a precancerous stage. The everchanging tides of physiologic activity within the endometrium renders it even more difficult to interpret the hall marks of early malignancy in the uterus than any other

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organ in the human economy. Thus Dr. Eden alludes to one slide which shows all of the stages of glandular mobilization between the postmenstrual intermediate, premenstrual, and menstruating endometrium. Even the good general pathologist with precious few exceptions is capable of passing a fine differential judgment between an early cancerous and a hypertrophic glandular change. In this phase of pathology, only a first class specially trained worker may be trusted in a critical case where a capital operation is to be determined from the microscopic slide. The gynecologist, well trained in symptomatology and gross diagnosis, would better be trusted in his final judgment than the general pathologist who depends solely upon the microscope for his decision. In other words, my plea is for a specially trained gynecologic pathologist in every well-equipped department, sufficient unto himself. A general pathologist, be he ever so efficient, is rarely capable of rendering a diagnosis in these very questionable cases. In my opinion, he errs in pronouncing the case malignant too often, and thus dooms possibly a young woman to a hysterectomy. I cannot help but look askance upon the term precancerous stage, for all too often the surgeon, possessed with a furor operative, falls upon this expression, as a sustaining one after the removal of a simple cystic breast, a hysterectomy for an eroded cervix, etc. Thus far, no one has I believe established such a stage as a definite and ascertainable precancerous entity. I am glad to see that Dr. Eden holds this term in decided reservation.

Dr. George Gellhorn, St. Louis, Missouri.—In general surgery and in dermatology the actual transformation of syphilis into cancer has been a long established fact, but in gynecology such a transformation is thus far only a matter of surmise.

I would like to show three slides which may throw some light upon the histogenesis of genital cancer upon the basis of syphilis.

The first picture is from an old syphilitic ulcer of the vestibule in Dr. Ehrenfest's and my report before this Society four years ago. On this side (indicating) there is normal pavement epithelium; underneath a zone of infiltration of lymphocytes and plasma cells which gradually becomes thicker toward the middle of the picture, with enormous proliferation of bloodvessels with thickened intima. On the outside there is a curious proliferation of pavement epithelium which sends out long slender processes

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into the underlying tissue, a picture suggestive of cancer were it not for the fact that these processes do not extend beyond the area of leukocytic infiltration. Furthermore, the basal layer of this epithelium is perfectly normal and the basal membrane is nowhere broken through. The case was subjected to treatment, and a few weeks later, when a second excision was made, the epithelium showed normal characteristics.

The second picture was taken from a paper by Rohrbach. This was a case of an old luetic ulceration in the labium majus. Here there is a very large proliferation of pavement epithelium and in the area of leukocytic infiltration there is an isolated nest of epithelium which on serial sections was found not to be connected with the surface epithelium.

Here (indicating) we have an entirely different aspect. The processes of epithelial cells extend into the underlying tissue, but the normal epithelium is greatly altered. The basal membrane is broken through. The cell contours are no longer clearly defined. The nuclei have lost their staining qualities, and are vesicular.

Here we have a pieture which corresponds in all details with the picture given by Ribbert of the early stages of epidermal cancer. Thc rcason why Rohrbach's diagnosis was the same as in my first ease was that the proliferation did not extend beyond the zone of lymphocytic infiltration into preformed tissue. This case was also subjected to energetic treatment, and within a short time the pathologic changes had disappeared. The fact that many of these cases are subjected to treatment seems to prevent the actual transformation of syphilis into cancer. If, however, such cases are neglected there is every reason to assume that in a fairly large proportion of them the actual transformation of syphilitic into carcinomatous tissue takes place.

Dr. Fred L. Adair, Minneapolis, Minnesota.—I wish to say a word or two regarding certain points after listening to Dr. Eden's very complete and able contribution. Some twelve years ago I spent considerable time in going over a large number of cervices, particularly in relation to erosions around the external os. Aside from the so-called congenital erosion, which has no particular place in this discussion, the erosions seem to originate from a combination of inflammation, maceration and taxumatism. It seems to me, that this point is of importance

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FIG. 1

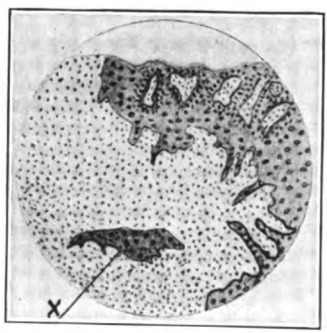

FIG. 2

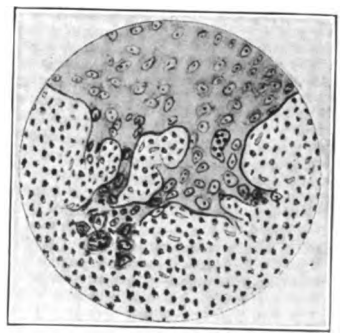

FIG. 3

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in connection with the subsequent history of some of these cases of erosion. Most of these erosions develop in association with parturition, or in some cases from inflammatory conditions which involve the cervix. In order to avoid these erosions developing into malignancy, the early treatment of them should be instituted. This can be done nicely by proper supervision of the obstetrical cases and the early treatment of these erosions by the elimination of those different factors which enter into the individual cases, namely, the traumatism, inflammatory processes, and the maceration. The columnar epithelium is better able to resist these factors than the squamous epithelium, particularly maceration, and that is the reason erosions occur. After some of these factors have subsided the squamous epithelium seems to have greater resistance and is better able to survive, and I was able to demonstrate definitely in some specimens that in the process of healing there is no metaplasia or transition of the columnar epithelium into squamous epithelium, or of the latter into columnar epithelium. This can be distinctly demonstrated by differential staining with mucicarmin, showing squamous epithelium growing underneath the columnar. This takes place not only on the surface but it grows down into the glands underneath the columnar epithelium, and in some instances I was able to show complete Nabothian cysts which were lined with squamous epithelium, in which the columnar epithelium was either partially or completely replaced by squamous epithelium, not by metaplasia but by definite undergrowth of squamous epithelium. That metaplasia may occur I am not prepared to dispute, but that it is usual in the process of healing in this condition I do not think is true.

These erosions present a most fascinating picture from the varying pictures of epithelium and glands, and it is a very fruitful field for studying the transitional changes between the ordinary simple erosion and malignancy.

Dr. Joseph Brettauer, New York City.—From a clinical point of view, we all subscribe to what Dr. Clark has just said. "Cancerous age" as a specific age ought not in my opinion be used. There is no such age. We see cancers from the age of fifteen up to the postclimacteric period.

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Dr. Joseph B. De Lee, Chicago.—No one has said anything on the obstetric side of these conditions that have been demonstrated on the screen. I am prompted to say that if obstetricians devoted more care to their obstetric cases they would not see so many lacerations and erosions which may or may not ultimately develop into cancer. If practitioners will observe these rules there will be fewer lacerations and erosions. (1) Not dilate the cervix with the fingers when they do not have to; (2) not to give pituitrin; (3) not to use bags; (4) not to infect the woman; (5) if lacerations should occur, repair them at once.

Dr. Thomas Watts Eden, London, England (closing the discussion).—I think we have had a very interesting discussion.

I was much interested in Dr. Adair's remarks. I did say in describing erosion it was formed by the stratified epithelium giving place to the columnar epithelium, not by metaplasia.

I am very much in sympathy with Dr. Clark's position. I suppose all of us have suffered at the hands of the general pathologist. There is no doubt that for gynecologic pathology a man needs special training. I was especially glad he pointed out the importance of keeping the laboratory work and clinical work in close association.

I feel perhaps I ought to apologize for talking to an audience of clinical men about pathology, but I do think that men who operate ought to know what they see when they look down a microscope.

I have not given you abstruse details of histology, but such points as we have been discussing we ought to be in a position to settle ourselves. While we cannot escape seeking the help of the pathologist from time to time, I think clinical gynecologists who run large services ought to be able to do most of the histology themselves.

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MICROSCOPIC STUDIES OF TUBAL PREGNANCY

By Jennings C. Litzenberg, M.D.
Minneapolis, Minn.

We find many conflicting statements in medical literature about the microscopic appearance of the pregnant tube.

Among investigators, however, there is not much difference of opinion. Most of the varying statements are due to a perpetuation by non-investigators of errors of earlier observers without a careful scrutiny of the literature for more recent investigations.

It is with the hope of clarifying some of these supposed controversial points that this material is presented.

It occurred to the writer some years ago, when he began collecting this material, that it might be of advantage to section the tubes longitudinally rather than in the usual cross-section.

The advantages of this method were conceived to be: (1) In serial section studies of the whole tube there would be fewer slides (there proved to be 300 to 700 longitudinal sections and 2000 to 4000 cross sections); (2) that the tubes being cut from the uterine to the fimbriated end a better opportunity for naked-eye or hand-glass study might be offered, showing on one slide in the central sections of each tube the condition and relations of all parts of the tube to the ovum.

Implantation of the Ovum. Inasmuch as the uterus and tubes are genetically identical, and therefore composed of the same tissues, we might well expect the same reaction of the uterine and tubal elements to a pregnancy. Careful observations demonstrate that the physiologic scheme is followed

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exactly in both uterus and tube; in the latter, however, the results are pathologic from the beginning because the ovum is implanted in an organ entirely unfitted anatomically for its reception or development.

We find in tubal pregnancy the analogues of everything occurring in an intrauterine gestation, but never the identical thing itself, because of anatomic and histologic differences of the two organs, *i. e.*, the processes are the same but the results inevitably different.

Implantation occurs in exactly the same manner in both uterus and tubes; the ovum burrows into the mucous membrane in each instance, but from the moment of entrance it meets different conditions and its further history is determined by them.

Decidua. In the uterus the fertilized ovum finds a mucous membrane whose stroma, either because of the greater thickness or because of specialization, is capable of developing into decidua thick enough to harbor the ovum, protect the muscle of the uterus from the arrosive action of the trophoblast and extensive and loose enough to form the decidua capsularis.

In the tube, on the other hand, there is so scant connective-tissue stroma (or specialization of the tissue is lacking) that we find no true decidua, although "decidual reaction" can be demonstrated.

In the uterus the decidua, because of its important function, might well be called an organ; in the tube we find no such organ, but decidual cells are discernible throughout the mucous membrane of the tube either as isolated cells or in groups but never as true decidua.

Basalis. There has been more controversy about the presence of decidual cells in the basalis than in any other portion of the tube, some observers contending that they have never found them and others that they were always found in abundance. This difference of opinion arises from two things: 1. That decidual cells are, indeed, in all cases, very scarce requiring prolonged search. Often in serial sections they will be demonstrable only in very few slides. In this small series

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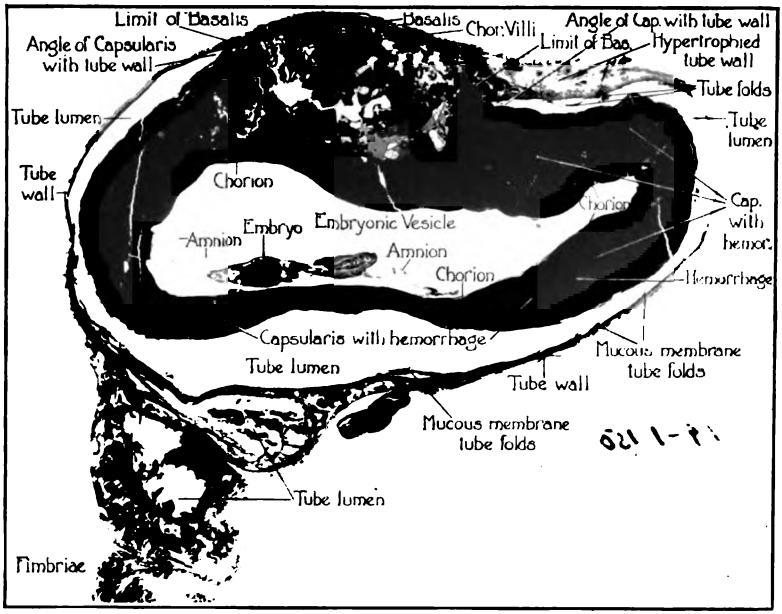

FIG. 1.—Photograph of longitudinal section of tubal pregnancy, showing relations of ovum to tube; basalis (serotina), with riddled tube wall beneath it, capsularis (reflexa) distended by hemorrhage, the angles of capsularis with tube wall particularly distinct, embryonic vesicle bounded by chorion, amnion with contained embryo, hypertrophied tube wall near basalis and then distended tube wall.

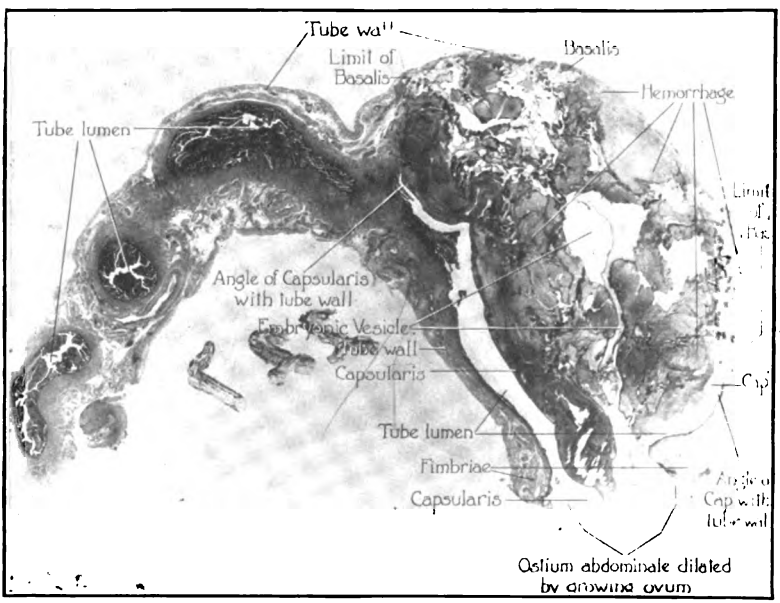

FIG. 2.—Photograph of longitudinal section of pregnant tube, showing implantation near fimbriated end of tube, ovum bulging through end of tube by growth of embryo through ostium abdominale and not by tubal abortion.

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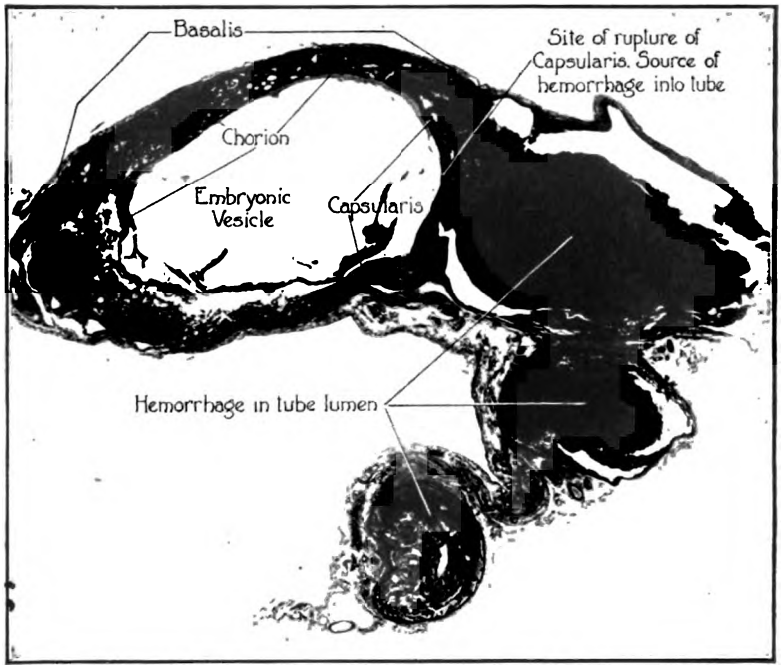

FIG. 3.—Photograph of longitudinal section of tubal pregnancy, showing rupture of capsularis (inner ovum capsule), with resultant hemorrhage into tube lumen due to inner rupture not to tubal abortion.

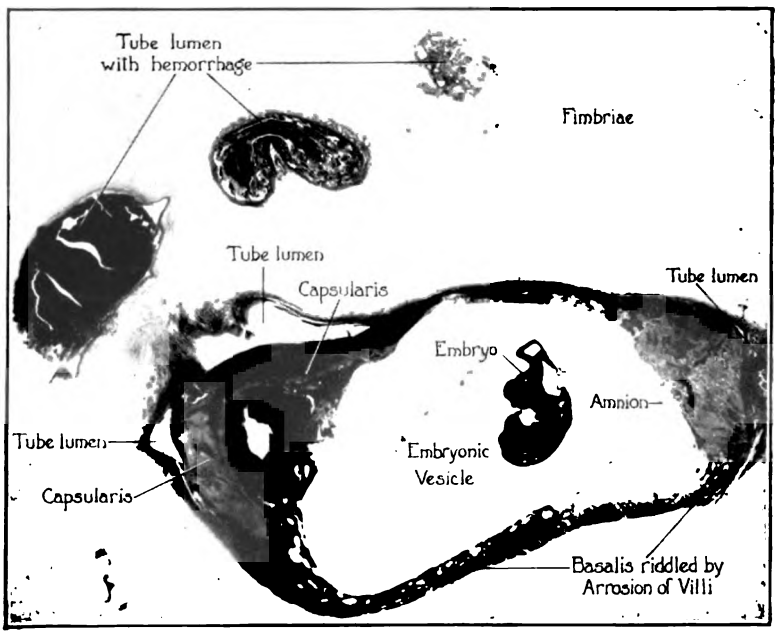

FIG. 4.—Photograph of longitudinal section of tubal pregnancy, showing hemorrhage into tube lumen due to rupture of capsularis, also shows embryo in tube.

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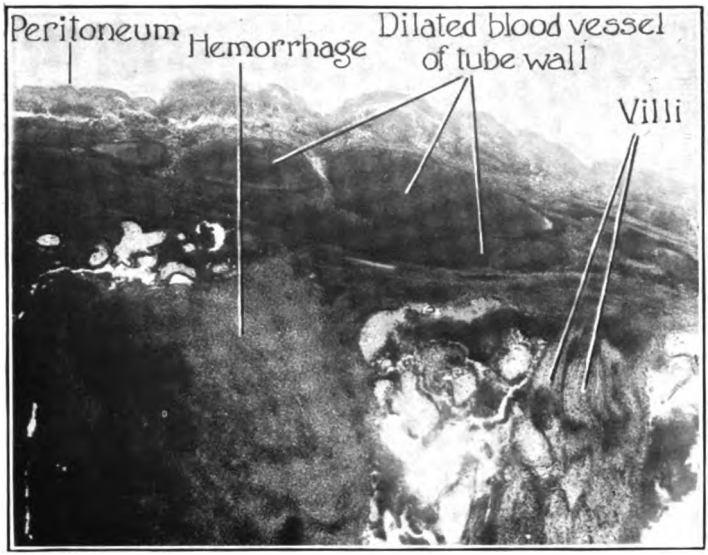

FIG. 5.—Photomicrograph, showing large dilated bloodvessels of tube wall, anchoring villi and hemorrhage (not orderly circulation) into intervillous spaces.

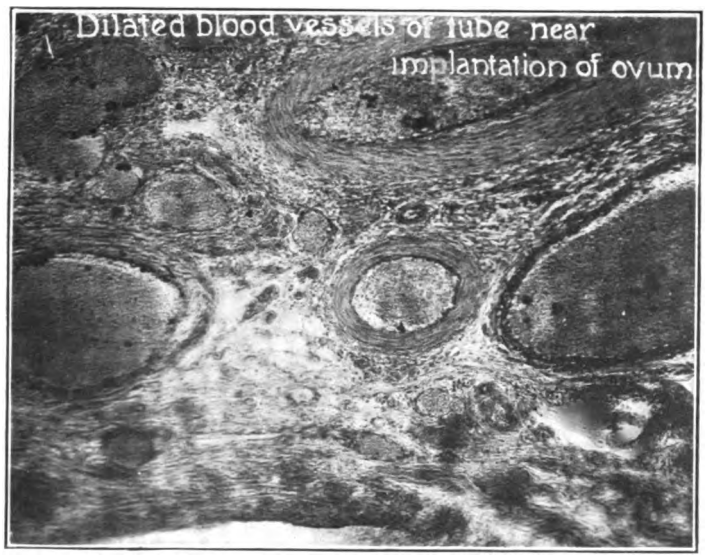

FIG. 6.—Photomicrograph, showing dilated vessels of tube wall.

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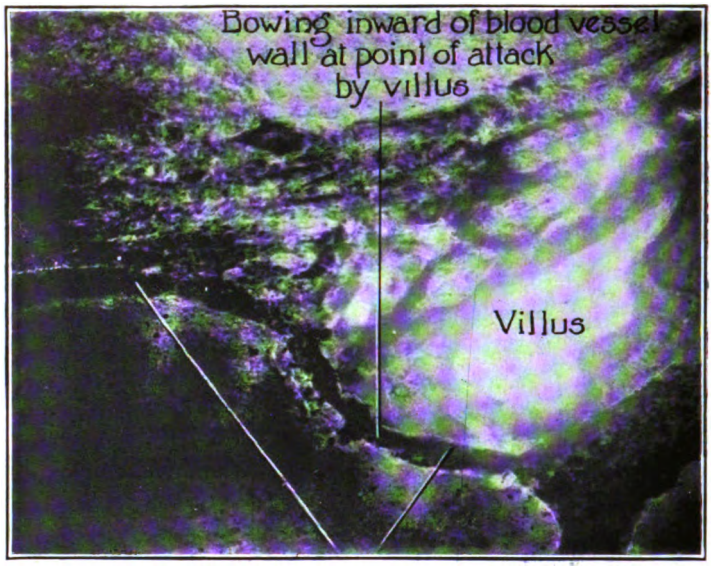

FIG. 7.—Photomicrograph, showing vessel wall bending inward as if the villus attacking it were exerting mechanical pressure.

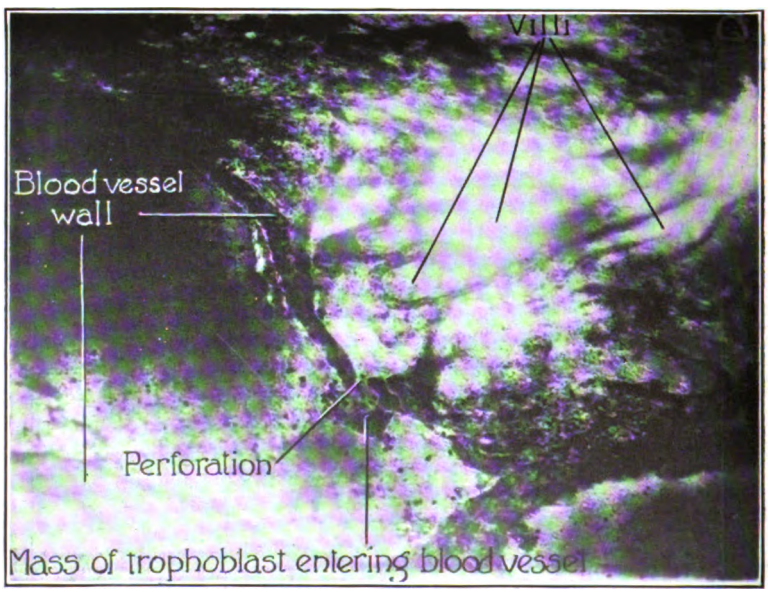

FIG. 8.—Photomicrograph, showing villus in the act of arroding the vessel wall, mass of trophoblastic cells within the vessel just having completed the perforation.

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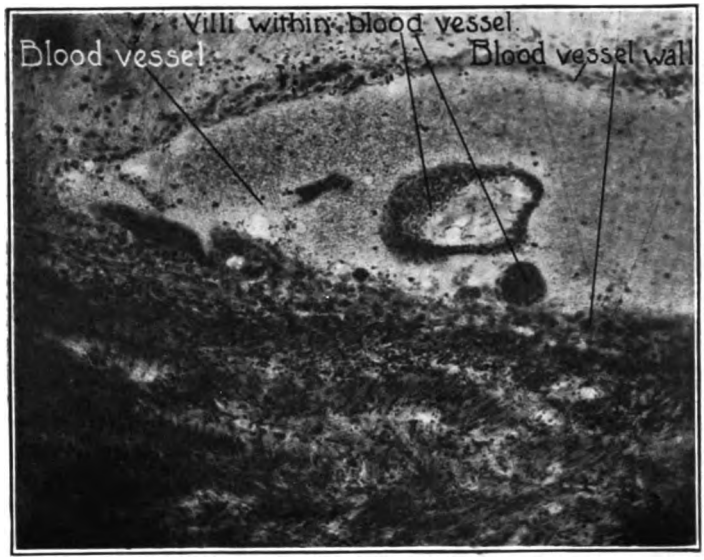

FIG. 9.—Photomicrograph, showing cross-sections of villi entirely within a vessel of the tube wall.

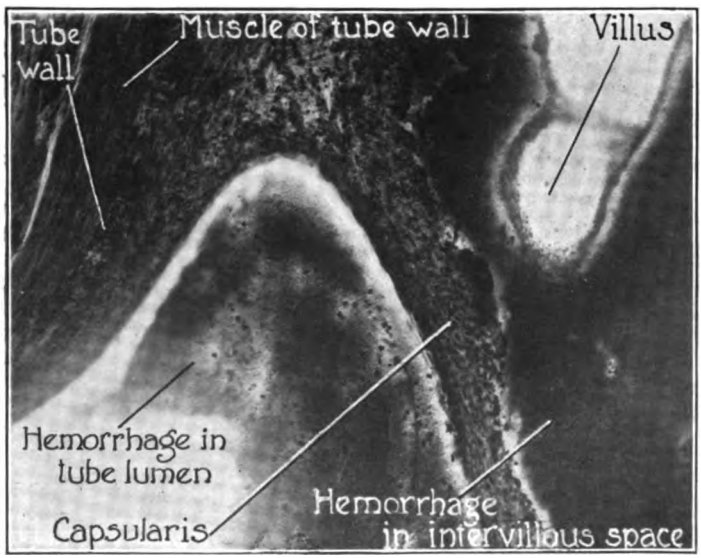

FIG. 10.—Photomicrograph, showing angle of reflection of capsularis (reflexa) from tube wall, also hemorrhage in intervillous space and tube lumen.

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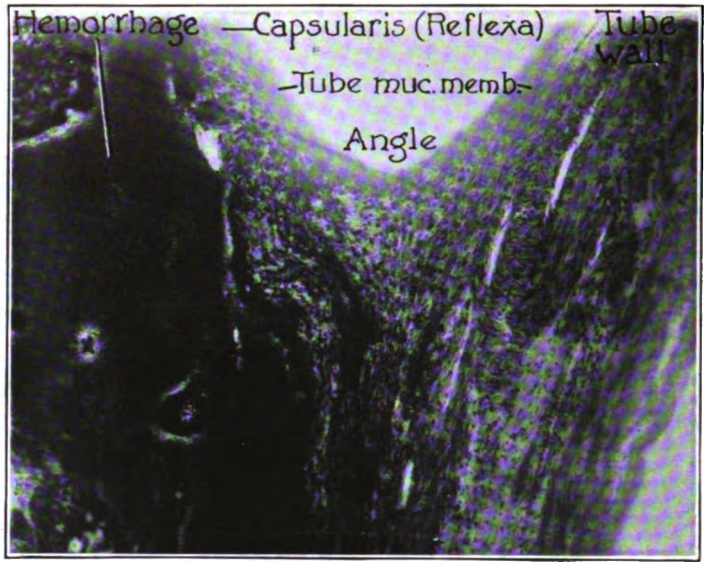

FIG. 11.—Photomicrograph, showing angle of capsularis (reflexa) with tube wall and hemorrhage in intervillous spaces.

FIG. 12.—Photomicrograph, showing more or less scattered trophoblastic cells frequently mistaken for decidual cells.

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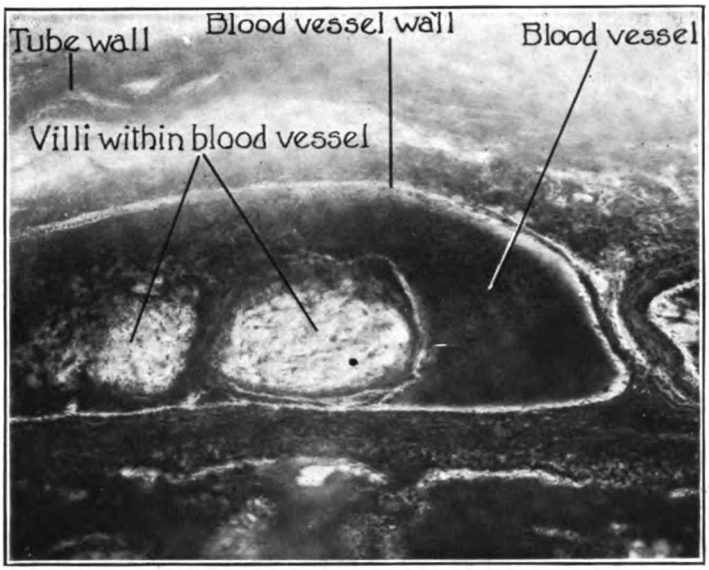

FIG. 13.—Photomicrograph (retouched), showing cross-section of two large villi entirely within bloodvessel of tube wall.

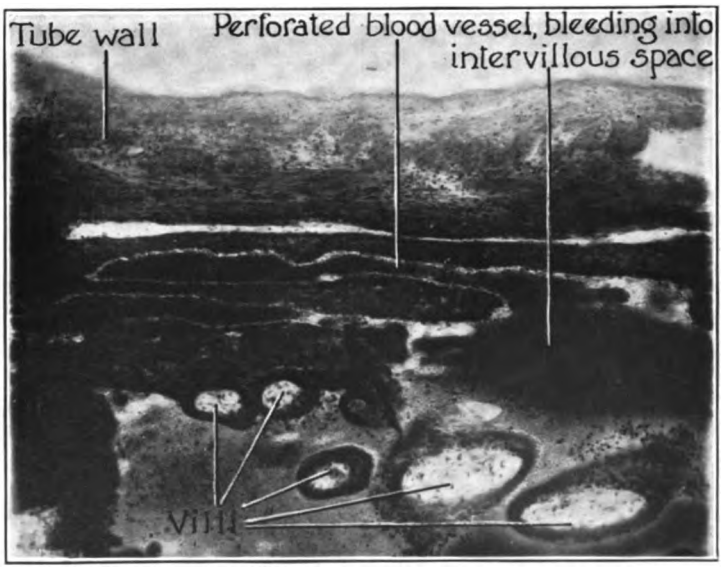

FIG. 14.—Photomicrograph (retouched), showing hemorrhage pouring from arroded bloodvessel of tube wall into intervillous space.

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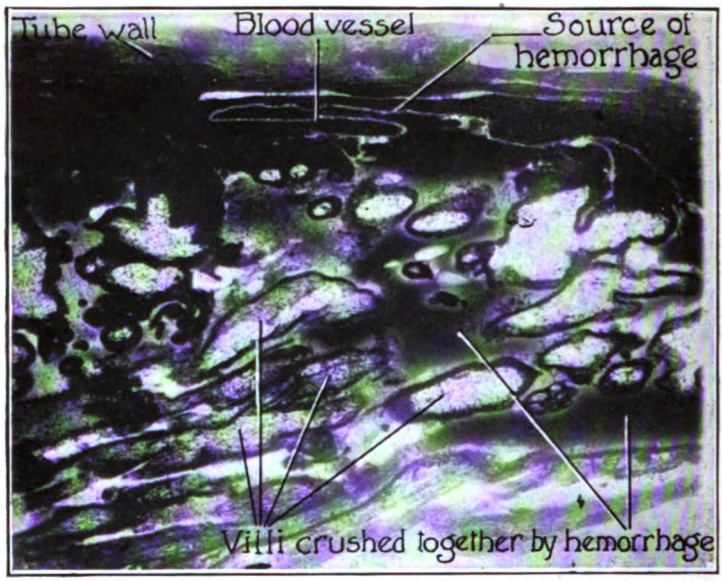

FIG. 15.—Photomicrograph (retouched), showing how the large hemorrhage of the vessel shown in Fig. 14 is crushing the villi together and destroying their normal relations to each other and to the tube wall.

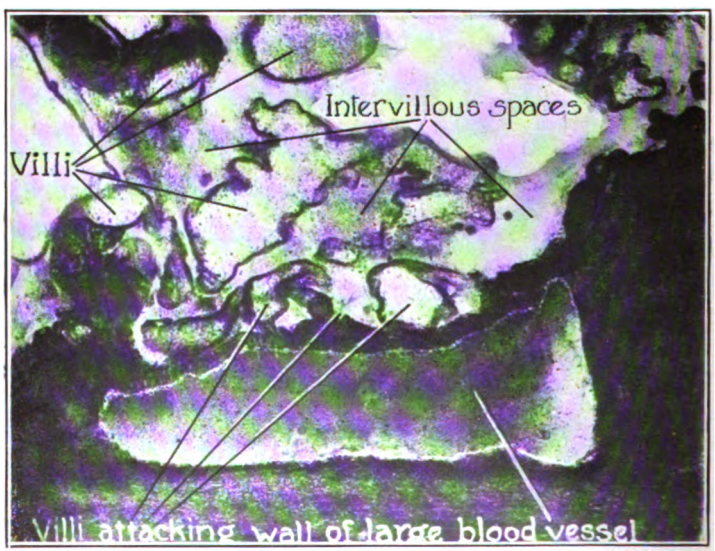

FIG. 16.—Photomicrograph, showing very large vessel being attacked by villi.

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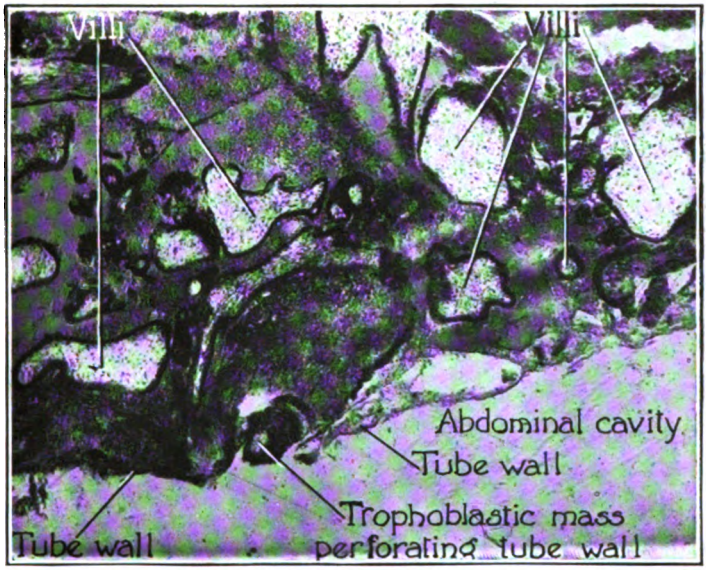

FIG. 17.—Photomicrograph, showing several villi attacking tube wall and the trophoblastic cells of one having completely perforated the wall.

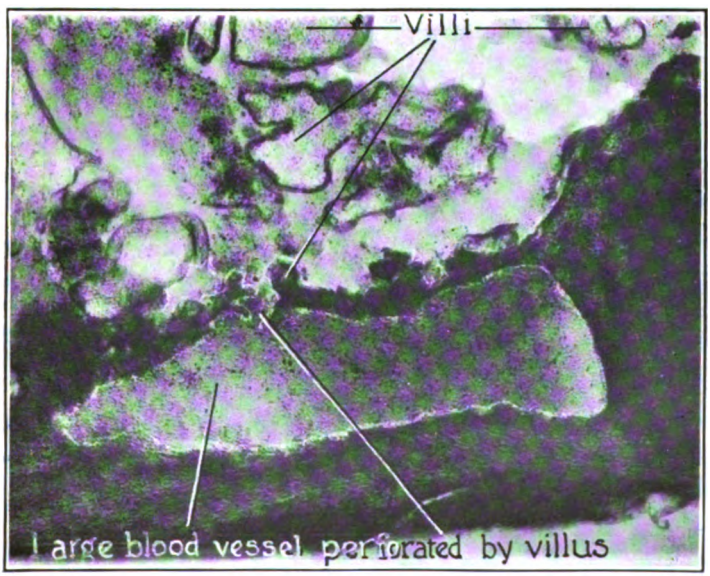

FIG. 18.—Photomicrograph, showing perforation in vessel wall caused by arrosive action of villi.

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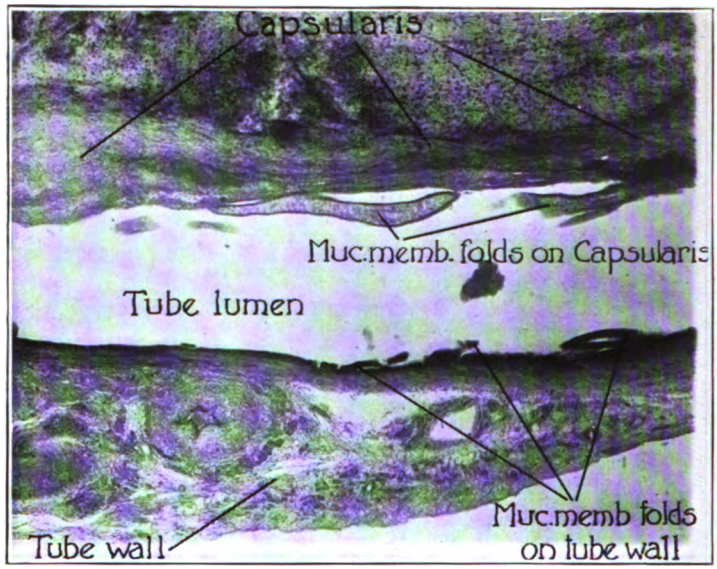

FIG. 19.—Photomicrograph, showing tube wall and capsularis opposite covered by tubal mucous membrane, proving conclusively the existence of a capsularis (reflexa) in tubal pregnancy.

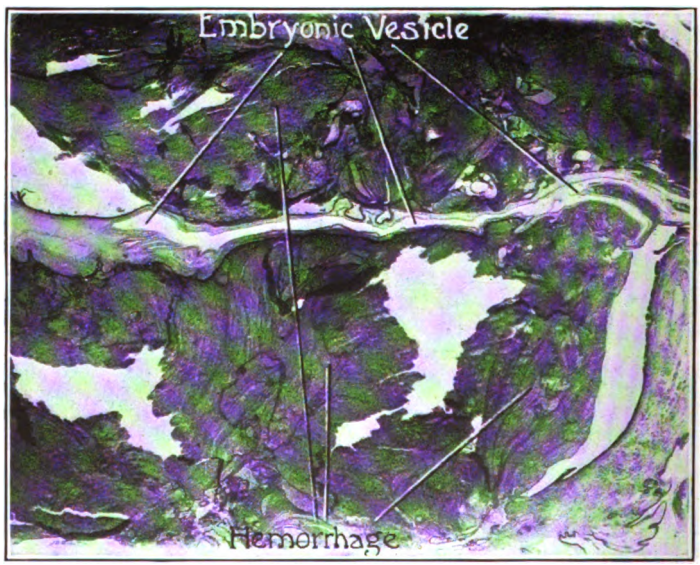

FIG. 20.—Photomicrograph, showing hemorrhages in capsularis which is so massive that it has flattened the embryonic vessel, so that it looks like a tube.

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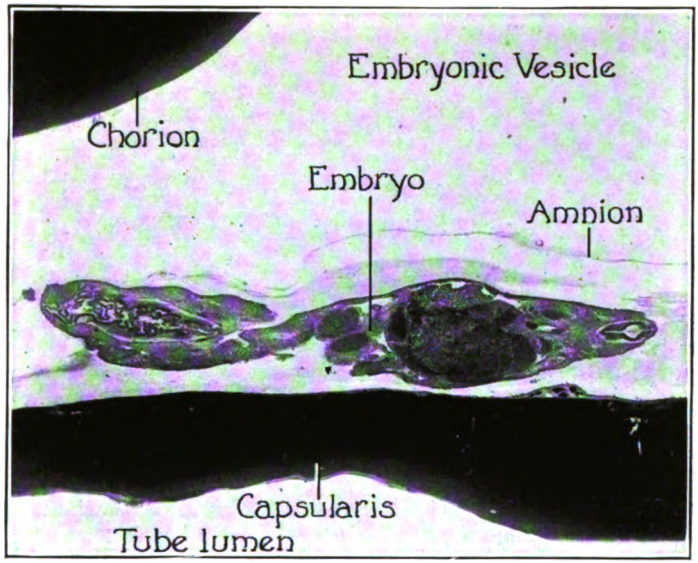

FIG. 21.—Photomicrograph, showing details of embryo.

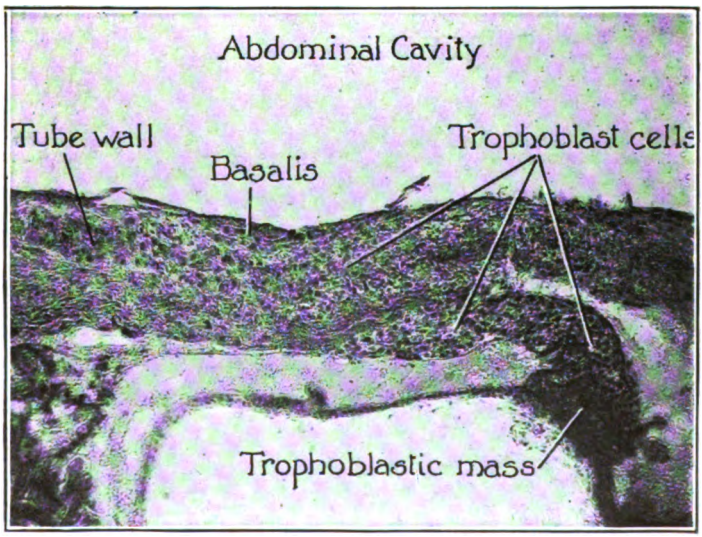

FIG. 22.—Photomicrograph, showing dense trophoblastic cell mass gradually fading out to isolated cells which are often mistaken for decidual cells.

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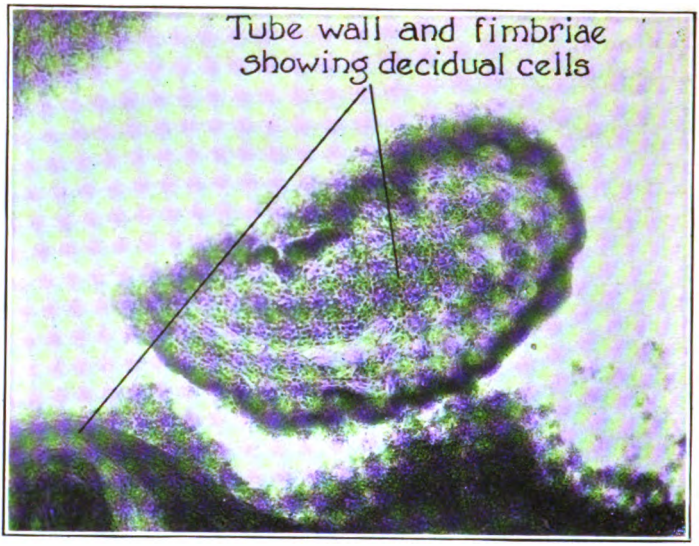

FIG. 23.—Photomicrograph of fimbriated fold, showing decidual cells, illustrating the fact that the farther we get from the site of implantation the more decidual reaction is found.

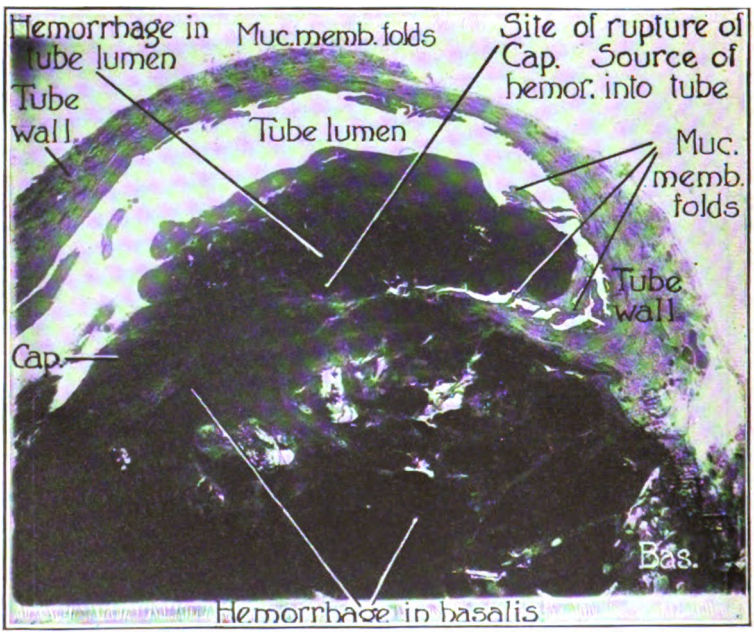

FIG. 24.—Photomicrograph, showing the angle between the tube wall and the capsularis (reflexa) mucous membrane of the tube wall reflected for some distance on the capsularis; shows also massive hemorrhage into intervillous spaces, site of rupture of capsularis (internal ovum capsule) and hemorrhage through rupture into the tube lumen.

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they have always been found, but in some specimens only after laborious hunting through numerous serial sections. One cannot say there are no such cells unless he has examined every slide of serial sections of the whole tube; (2) those who claim that decidual cells are found in abundance in the basilis probably are making the same mistake that the earlier observers made, namely, misinterpretation of trophoblast cells as decidual cells. When these cells are isolated or in groups not showing direct connection with trophoblast masses (Fig. 12) it is easy to mistake them for decidual cells. However, their trophoblastic origin can be demonstrated in slides where the undoubted deeply stained trophoblastic mass is in direct continuation with the less deeply stained but evidently identical cells (Fig. 22).

Even though decidual cells may be found in the area usually called decidua basalis, true decidua is never present, hence we cannot, in truth, speak of decidua basalis in tubal gestation. We have the analogue but not the thing itself; therefore, for want of a better term, it will simply be called "basalis" (Figs. 1, 2, 3 and 4).

Inasmuch as there is no decidua in the basilis, or what little there might have been having been destroyed by the arrosive action of the trophoblast, the ovum almost immediately after penetrating into the mucous membrane comes in contact with the inner muscular layer of the tube, continues its arrosive action on the muscle in its attempt to fasten itself and seek blood supply, thus literally riddling the muscle and weakening the wall.

Fig. 22 shows the muscle layer in process of destruction by the trophoblast and Fig. 5 shows the villi anchored directly into the musculature of the wall and arroding it.

In the uterus the thick decidua basalis protects the muscle wall from such attack, and, furthermore, furnishes ample area for the excavation of the sinuses or lacunæ by the trophoblast within the decidua. The vessels in the uterine decidua basalis arroded to furnish the blood to the lacunæ are very small, causing not a hemorrhage but a normal blood supply to the

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intervillous spaces, while in the tube, this protecting decidua being absent, the muscle is attacked and the vessels arroded are much larger, thus causing a hemorrhage instead of a normal blood supply into the intervillous spaces.

The bloodvessels of both the uterus and tube are dilated in the region of the implantation of the ovum, but in the uterus they are protected from the destructive action of the trophoblast by the presence of the decidua basalis, so that only the smaller vessels in the decidua itself are attacked. In the tube, on the other hand, on account of the absence of the decidua, the unprotected dilated vessels in the musculature are arroded, causing a hemorrhage in the intervillous spaces instead of a normal blood supply. This hemorrhage is sometimes so profuse that the villi are displaced and crushed together and the ovum capsule is distended beyond its ability to resist and the blood bursts through into the tube lumen.

Figs. 5, 6 and 16 show the dilated vessels of the pregnant Fallopian tube in the region of the implantation.

Figs. 5, 7 and 16 show villi close to the walls of the large bloodvessels; Fig. 18 shows the villi in the act of penetrating the vessel walls; Figs. 8 and 18 the penetration is completed, and in Figs. 14, 15 and 18 the blood-flow between the vessels and intervillous spaces is completely established.

When we note the size of the vessels in Figs. 5, 6, 8, 14, 16 and 18, which may be or have been perforated by the arrosive trophoblast or villi, it is very easy to understand why we see so much hemorrhage into the intervillous spaces, capsularis and tube lumen. Figs. 8 and 15 show the villi distorted and crushed together by the excessive amount of blood in the intervillous spaces, and Fig. 20 shows such an amount of hemorrhage that we see scarcely anything but blood, which is so excessive that it has flattened the embryonic sac so that it looks like a tube.

Webster said that in all the pregnant tubes he had examined he had never seen a capsularis without hemorrhage.

The writer believes that hemorrhage is the rule.

Figs. 5, 8, 10, 11, 13, 14 and 15 show the excessive amount

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of blood in the intervillous spaces and Fig. 19 and 24 show the same condition in the capsularis, while Figs. 10 and 24 show the blood free in the tube lumen, having burst through the capsularis.

CAPSULARIS. The earlier writers said little about finding a decidua capsularis (reflex), but von Winkle, in 1871, described an ovum with a reflexa (capsularis), and Werth, in 1887, described one with a maternal enveloping layer corresponding to the decidua capsularis, and he was the first to describe it histologically. Zedel and many others confirmed Werth's findings, but here again the early errors appear in some writings, although investigators are in substantial agreement that there is in tubal pregnancy an analogue of the decidua capsularis of intrauterine pregnancy; but here, as in the basalis, there is no true decidua, although decidual cells and cell groups are frequently found. The writer has found them more frequently in the capsularis than in the basalis in spite of the fact that hemorrhage is universally present in capsularis masking the cell elements.

That there is a capsularis the analogue of the decidua capsularis of the uterus is shown in Figs. 10, 11, 19, 24 and 1.

Mucous membrane and tube folds and other wall tissue can be demonstrated on the ovum mound, projecting into the tube lumen, proving conclusively that it is truly "capsularis" in spite of the fact that there is so little decidual reaction that we cannot call it "decidua capsilaris."

This "inner ovum capsule," as it has been well called, is inherently weak, has not the quality of expanding and growing with the ovum as true decidua has, and it is also further weakened by arroding villi just as the tube wall is, hence it ruptures easily (Figs. 3, 4 and 24).

DECIDUAL FORMATION IN OTHER PARTS OF THE TUBE. It really seems that the farther away from the site of implantation we get the more decidual reaction we find. We see it in distant parts of the tube, in the fimbria (Fig. 23), in the peritoneum of the tube, and it has been observed even in the opposite non-pregnant tube.

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MUSCULARIS TUBAE. Werth noted thickening of muscle of tube outside the implantation area. This has been observed also in this series (Fig. 1); however, it is not a constant finding and has been seen only in the neighborhood of the implantation. The muscle in other parts of the tube is not greatly modified except where it is put upon the stretch by the growing ovum (Figs. 1, 3 and 4).

RUPTURE AND ABORTION. It is usually stated that ectopic gestation is terminated by "tubal rupture" or "tubal abortion," which statement is only approximately correct for the reason that the condition called "tubal abortion" is not, strictly speaking, an abortion, analogous to a uterine abortion, *i. e.*, a separation of the ovum from its attachment and extrusion by the activity of the musculature of the tube. Separation does sometimes occur, and the ovum may be found free in the tube lumen; but that this is the rule in the so-called tubal abortion or that the tube has power to expel the separated ovum is very doubtful.

The fact that the ovum of an extrauterine pregnancy is frequently found protruding through the ostium abdominale of the tube does not prove that a tubal abortion is occurring, for this condition is not usually due to an expulsion of a separated ovum by the tube but is caused generally by the fact that in such cases the implantation of the ovum has occurred near the fimbriated extremity, and the ovum is protruding, not because it is separated and being expelled, but because it is pushing through the end of the tube by virtue of its own growth and enlargement, which slowly dilates the abdominal opening of the tube and the ovum is not separated from the original site of implantation. This is illustrated by Fig. 2, in which the ovum is seen implanted near the ostium abdominale, is unseparated and unruptured, but is protruding from the end, and is dilating the opening by its own increase in size. By strict interpretation of terms this could hardly be called an abortion.

Of course, in this particular specimen there is a tremendous intraovular hemorrhage and the embryo is pathological. The embryonic sac was compressed by the hemorrhage into a tube-

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like body (Figs. 2 and 20), but by looking at this picture it seems logical to assume that in a case in which the ovum did not perish it could continue its growth through the end of the tube, retain its attachment to the original site of implantation, increase the placental area in the same manner as in the uterus, extending simply by continuity over the surface of the broad ligament and adjacent pelvic structures, and an abdominal pregnancy result. It is the writer's belief that this is one logical explanation of some cases of abdominal pregnancy, for he cannot believe that such a condition can occur by a reattachment of a separated ovum, and it seems rather doubtful that an abdominal pregnancy can follow a rupture through the tube wall, and there is doubt that an ovum can primarily implant itself in the peritoneum.

If the implantation is nearer the uterine end of the tube the termination will be either "external rupture" of the ovum capsule through the tube wall into the abdominal cavity or "internal rupture" through the inner ovum capsule into the tube lumen, or, rarely, separation of the ovum, in which case it perishes, may become a tube mole or it may be pushed along toward the fimbriated end by the hemorrhage but not by the tube muscle. True abortion is rare in the writer's opinion. "Internal rupture" is a better term than "tubal abortion," for, although in a great majority of so-called unruptured tubes hemorrhage into the tube and from the ostium abdominale is the rule, it is not always due to separation of the ovum, as in uterine abortion, but is more often due to a rupture of the internal ovum capsule caused by distention of the ovum capsule by the hemorrhage explained above, and by a weakening of the capsularis by the arrosive action of the villi. Fig. 1 shows the capsularis distended with blood, and Fig. 3 shows the rupture of the capsularis or internal capsule and the blood escaping into the tube lumen and flowing toward the fibriated end. In all of these illustrations the ovum is not separated from the tube wall.

"External rupture" may be either a true bursting of the weakened arroded tube wall under pressure from within, due

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to growth of the ovum and distention by hemorrhage or it may be only an arrosion by villi, the wound being very small, and yet it may terminate fatally because a large vessel has been opened.

Fig. 17 shows a trophoblastic mass having perforated the tube wall and Figs. 1, 2, 3 and 4 show how the tubal wall has been "riddled" and weakened by the arrosive action of the villi.

It is easy to understand how such a weakened wall can rupture. Werth observed that when trophoblastic masses or villi come in contact with the vessel which it is to perforate there is a bowing inward of the wall toward the lumen of the vessel just as if it were under mechanical pressure. This is well shown in Fig. 7.

Not only are masses of trophoblastic cells seen just within the vessel wall after perforation (Fig. 8), but sometimes large masses or even whole villi are observed in the vessel, perhaps having been swept in by the blood stream from the intervillous spaces. Figs. 9 and 13 show cross sections of villi entirely within the vessel.

Time will not permit detailed description of the embryos found in this series, therefore I will, without discussion, call your attention to Figs. 1, 4, 20 and 21 in which the embryos are shown *in situ*.

In conclusion, without any attempt to enumerate the specific points, it may be said that every physiologic process occurring in intrauterine pregnancy is repeated in tubal gestation, but from the moment after the ovum has penetrated the mucous membrane of the tube every detail is pathologic.

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GYNECOLOGICAL PROBLEMS IN INDUSTRIAL MEDICINE

By Harry E. Mock, M.D.
Chicago, Ill.
(By Invitation)

The noted gynecologist, Howard Kelly, in 1908, pointed out the inhuman and intolerable conditions under which most working girls were forced to labor. He stated: "Their conditions are so bad as to be absolutely defenceless from social and economic reasons irrespective of health, and reform will come, though perhaps slowly, that will make it impossible to exploit the work of a girl who has not reached the age of puberty." He classified ill effects upon the health of all working women as due to their external conditions:

"1. Long confinement indoors in superheated, badly ventilated, dirty rooms.

"2. Work permitting little change of posture and enforcing either long-continued sitting or standing.

3. Contact with unhealthy work companions suffering from tuberculosis or other infectious diseases."

These conditions existed not only for the factory girl but for the clerks in stores and the teachers in schools. Kelly said: "The remedy for these conditions will never be effective until all places of employment for women are under rigid inspection of a competent health department with power to enforce sanitary conditions."

"Reform of these intolerable conditions" was a prophecy in 1908 that has been largely accomplished during the last decade, and to the glory of the medical profession can much of

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the praise for this accomplishment be attributed. Medico-sociologic problems are being considered more and more by great scientific gatherings such as this, demonstrating that the profession is awake to the broad duty of conserving the nation's man-power as well as to the problems of disease in the individual.

The last ten years have witnessed the birth in our profession of a new specialty known as industrial medicine and surgery. From the old-time company surgeon content with the bandaging of cuts and the anointing of bruises there has evolved a new type of physician in industry concerned with the whole problem of human maintenance. Before entering upon a discussion of the gynecologic problems which present themselves to such a human maintenance department it is desirable to give a brief outline of what is included in industrial medicine and surgery as applied to the individual industry.

In an industry employing hundreds or thousands of people a veritable human laboratory is furnished the physician, where he can study problems of medicine, sociology and economics hand in hand. He soon develops the habit of interpreting his medical results in terms of the economic end-result instead of awaiting the development of disease or injuries to apply his curative methods. He forms habits of studying the prevention of diseases and accidents. In time a competent health department is developed in the industry, which includes the following activities:

I. The Prevention of Disease and Accidents

(a) By a study of the nature of the work and the discovery of possibilities for occupational diseases and methods of preventing the same.

(b) By safety methods, educational campaigns and a "follow-up" of every injury cause in order to prevent new accidents or recurrences of accidents.

(c) By industrial sanitation: improving the working home, removal of dusts, gases, etc.; ventilation, illumination, proper

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eating places, sewage and garbage disposal; cleaning, care of toilets and cuspidores; and numerous other sanitary measures.

(d) By a study of the physical conditions of the employees themselves and their relation to occupation to discover possibilities for breakdowns due to misfits; or due to fatigue poisoning; or potential causes for accidents within their bodies, or possibilities of spreading diseases to fellow employees.

II. The Supervision of the Health of Employees

(a) By physical examination of all applicants for work in order to place employees on jobs according to this formula: physical qualifications plus occupational qualifications equal the job; and again to eliminate those applicants who cannot be employed "with safety to themselves, to others or to property."

(b) The physical examination of old employees at stated intervals or wherever indicated—one of the best means of coming into personal contact with each worker.

(c) By health talks to individuals and to groups and by personal advice bearing on each particular case.

(d) By developing habits of exercise, bathing, proper diet, etc., among the employees.

III. Adequate Medical and Surgical Care

(a) By supervising the type of medical care received from outside physicians.

(b) By furnishing proper medical care in certain types of cases.

(c) By furnishing the best surgical service to all injured employees.

IV. Nursing Service

(a) By furnishing trained nurses to assist the plant physician and often to render certain forms of first aid.

(b) By nurses visiting all sick employees; to see if proper care is being received, to assist by certain nursing duties, and

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otherwise show the friendly interest of the employer in the sick employee.

Ten years ago only a few of the larger corporations had installed medical services. The number gradually increased until, in 1916, it was possible to organize the American Association of Industrial Physicians and Surgeons, composed of 150 members, physicians who were pioneering in this field of conserving and reclaiming the man-power in the industrial army.

Then came the War and with it the very rapid development of this new specialty. It is wrong, however, to speak of it as a "new specialty," for industrial medicine is only the application of old principles of prevention and curative therapy to large groups of people. But the cry for more and more production in the essential industries caused many of them to install medical departments in order to maintain their working forces. The adoption of many of the principles of industrial medicine by the army and their further development, with the opportunity of observing their worth when applied to hundreds of thousands of men, resulted in establishing industrial medicine and surgery upon a firm foundation.

Today at least 400 industrial concerns have adopted a more comprehensive medical service than that of a company doctor, whose sole duty is the care of injury cases. At present the American Association of Industrial Physicians and Surgeons has 600 members representing this broader type of physician, giving part or all of his time to industrial practice. We have classified 2000 physicians who are doing chiefly industrial work. There are at least 5000 more physicians employed by the accident insurance companies to care for injured workmen. Some of these are doing excellent work, but the majority represent the cheap contract practice which begets cheap service and very poor results.

When you consider that over 30,000,000 of our people are engaged in gainful occupations and that only between 6,000,000 and 8,000,000 of this enormous army are receiving any kind of organized, adequate, preventive and medical

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service you gain some conception of the magnitude of the work still confronting the medical profession. It is the patriotic duty of our profession to train well-qualified physicians for this industrial practice and to educate employers and insurance companies to use only these qualified physicians in the protection of the lives and limbs of the working forces, for only in this way can we best contribute to the maintenance of the man-power of the nation.

It is estimated that at least 10,000,000 girls and women are included in this industrial army of 30,000,000 people. Thus it is apparent at once that the diseases and injuries peculiar to women furnish a large proportion of the problems connected with maintaining the human element in industry as an efficient force.

In past years I have received a great many inquiries concerning the type of occupations women should enter. During the war there was an effort made to have the Federal Government make a survey in order to classify positions available for women and to arbitrarily decide which of these occupations she could enter and from which she must be barred.

General principles on this subject might be laid down, but the real selection of proper occupations for women can only be made by considering each individual case in relation to her chosen work. In order to do this every woman worker should receive a careful physical examination and the occupation then chosen according to her physical qualifications. In every case the question of whether she is physically and mentally fit to do the work and whether the occupation will be unduly hazardous for her must be answered.

Medical Examination of Women Employees

The practicability of examining girl employees has been demonstrated in a number of large industries throughout the country. Some of these have employed women physicians and subjected every girl employee to a complete examination from head to foot, while the majority of concerns have given only a

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partial examination, including the head and neck and chest. Careful history taking and certain questions asked usually reveal abdominal or pelvic symptoms which indicate a more thorough examination. Consent of the parent or of some relative should then be obtained before making the pelvic examination, and then it should be made always in the presence of a nurse, and in the case of virgins under nitrous oxid anesthesia. One large industry which for three years completely examined every girl employee found that the number of pathologic conditions discovered by this system were only slightly in excess of those found by the partial examinations in other concerns. They have since discarded the method, as it was very distasteful to their girl employees.

The conditions usually found in healthy males by examining below the waist are hernia; venereal disease; hydrocele, varicocele and undescended testicle; varicosities, deformities of the extremities; flat-feet and other foot conditions. Remember most employees examined are apparently healthy and the examination is not made for the purpose of discovering some acute disease. The proportion of these conditions found by examining women below the waist are small compared with men. Hernia is rare in women—even the femoral type which is the commonest form found in this sex.

Dr. Schereschewsky states that he found one hernia in 500 examinations of female garment workers. In 2000 examinations of girl employees, where the history of the case indicated a more thorough examination, the author found three femoral and one inguinal hernia. In 500 consecutive examinations in a gynecologic dispensary the author found only five femoral or inguinal hernias, whereas umbilical and ventral hernia were common. These were chiefly found in older women who had borne children. Therefore the need of examining female employees for hernia is not sufficient to warrant subjecting them to the naked examination. Questioning as to whether they have a lump or swelling in the groin will usually be answered in the affirmative by a woman employee if a hernia does exist.

Venereal disease is often difficult to detect in women. I

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have been told by the physician in charge of the work in the concern referred to above that the percentage of venereal cases found by their complete examinations were very few. In our clinic we have discovered cases of syphilis among the girl employees, but this was done by the detection of mucous patches in the throat or the rash on the body.

Varicose veins are common among older women or among the married women who apply for work. These do not object to the physician examining their extremities. But the average girl employee has been protected from the type of occupations which have made varicosities more prevalent among the male workers.

Because of the rarity of conditions found below the waist line, influencing woman's fitness for work, most physicians in industry have therefore limited their examinations to the head, neck and chest.

Rest Rooms

No greater efficiency measure can be installed by an industry than a properly located, adequately equipped rest room, especially where girls and women are employed. In visiting numerous concerns I have found rest rooms provided for the girls which were located in some dark out-of-the-way corner or were part of the equipment of the toilet rooms. They were uninviting, and very few girls would use them. Wherever women are employed, clean, airy rest rooms removed from excessive noises should be provided. They should be furnished with single beds instead of hard cots, with clean pillows and sheets and warm blankets. A nurse or some qualified matron should always be in charge. Screens should separate the beds so as to furnish privacy to each girl. The room should be kept cool and well ventilated. Its very appearance should be restful. It has been my experience that girls with temporary sickness are always glad to go to such a rest room, remove only their shoes or perhaps loosen their skirts and corsets and crawl in between the clean sheets and under the warm blankets. The nurse can then bring them a hot-water

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bottle—often a hot drink. After an hour or so these girls usually feel sufficiently better so as to return to work. Without proper rest rooms these sick girls usually go home, losing the greater portion of the day and often longer because the exertion of going home has made the condition worse.

Drinking and Toilet Facilities

When employees are engaged on piece-work, and especially in the case of girls, one often finds that insufficient water is consumed and the requirements of nature are neglected. The girls refuse to lose the money by taking time off for these things.

The only solution for this is that the employer will give ample time, without loss to the employee, to attend to these essentials. Bubbling fountains should be located near the working places and every employee should be thoroughly educated to the importance of water-drinking. No better remedy is at hand for the prevention of fatigue than frequent flushings of the body organs by water.

For every 500 girl employees there should be provided close at hand at least five toilets. The toilet rooms should be kept clean and well ventilated. Washing facilities should be in the room or an adjoining room. Receptacles for refuse are necessary. Means for obtaining sanitary napkins should always be present in these rooms.

Clothing

In departments where men and girls work together great difficulties in ventilation are presented during the winter months because of the flimsy waists worn by girls. They are easily chilled when a window is opened and demand more heat than is wholesome in the departments.

Older gynecologists have complained of the tight corset and of the heavy skirts worn by women, and hanging from the waist, as the most frequent causes for enteroptosis and pelvic

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conditions among women. Today the tight corset and the heavy clothing are not so prevalent, neither are they as important a causative factor of these conditions as the faulty posture assumed by so many women and girls in standing and walking.

Shoes still play an important role in reducing the efficiency of working girls and undoubtedly contribute largely to many pelvic disorders. It is obvious that the high Cuban or French heels, with the thin turned sole or the low pumps, were never made to work in, especially if the work requires standing. If working women can be persuaded to wear shoes modelled after those recommended for soldiers they will develop strong feet and will be able to qualify for many more positions than have been opened to them in industry in the past.

High-heeled shoes, loose skirts, flowing sleeves and other peculiarities of dress are hazardous in occupations about machinery. During the war one state factory inspector informed me that in a large industry in which women employees had largely replaced the men there was a 50 per cent. increase in the number of fractures among the employees as compared with the year before. In 75 per cent. of these cases of fracture the high-heeled shoes worn by the women were responsible.

Diseases Common to Women Employees

From an analysis of 15,000 cases of absence from work on account of sickness I found that headaches caused 24 per cent. of the absenteeism. Headaches are more common among girls than men and cause a great loss to every concern employing girls. The condition is usually indicative of some other trouble, the correction of which will stop this drain in efficiency. Constipation is present in many cases, while diseased tonsils, defective teeth and other foci of infection about the nose and throat, as well as defective vision, are frequently the source of headaches. Fatigue-poisoning, faulty diet, especially at the lunch hour, insufficient water-drinking, late hours and many

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other conditions, either in their work, in their living conditions or in their bodies, have been found as the cause of headaches when the physician takes the time to carefully analyze these cases.

Dysmenorrhea came second in the causes for absence, making 18 per cent. of the absenteeism. When we consider the great number of girls who must rest for a few hours or slow up in their work for a day or two because of this condition of painful menstruation we realize that this problem is one of great economic importance, causing an incalculable loss to all the concerns employing great numbers of girls.

The causes of this condition are many. A small percentage are due to anatomic displacements or some pathologic change in the generative organs. The majority of the cases, however, are traceable to other conditions more or less remote from the pelvis. Of these, constipation and the conditions predisposing to this, such as improper food, lack of exercise, etc., is the commonest cause. A few years ago many state legislatures endeavored to improve health conditions among working girls by enacting laws making it necessary for them to sit while at work. In my opinion constant sitting during the long working hours is as bad if not worse than constant standing. This sitting posture causes more or less congestion of the pelvic organs, which is increased by constipation so often associated with constant sitting. If girls could be persuaded to dress properly and then could be gradually trained to standing and walking for several hours much healthier employment could be found for them than the sedentary occupations to which they are now condemned, chiefly by legislation. Under the existing conditions, occupations which allow part time sitting and part time standing, or if this is impossible, frequent rest periods which will allow the girls to stand and move about, will be found of the greatest benefit in overcoming dysmenorrhea.

The next commonest cause for this condition can be found in an unstable nervous mechanism. A large percentage of the

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girls who reported to the doctor's office because of painful menstrual periods also reported at other times because of various nervous manifestations, such as fainting, hysteria, "nervousness" and other neurasthenic symptoms. I have submitted hundreds of these girls to thorough physical examinations (not including vaginal), and many of these have shown the signs of neurocirculatory asthenia, the long narrow chest with the acute intercostal angle (Stiller type), movable or even floating kidneys, especially of the right side, exaggerated abdominal reflexes and general enteroptosis. Many girls suffer from neurasthenic symptoms during their periods which are based upon the teaching or lack of teaching of the mother. They are then told to keep quiet, avoid excitement, never bathe and similar instructions, all of which stimulates fear of consequences and tends to develop the neurasthenic state at each subsequent period. It is imperative that our girls be taught that this is a normal condition and should not be regarded as a "sick time." Fear is one of the greatest breeders of dysmenorrhea.

I have submitted girls to vaginal and rectal examinations, usually under gas anesthesia, whose dysmenorrhea could not be accounted for by the above conditions or cured by the correction of the same. Only a small percentage of these cases showed definite pathologic changes which could account for the dysmenorrhea. Of these an acute retroflexion of the uterus was the commonest finding, marked retroversion being the next commonest condition. These conditions were considered as possible causes only when associated with inflammatory changes. In many of these cases the rectum was found impacted with fecal matter even when constipation was not complained of. Care of the bowels and proper exercises, such as assuming the knee-chest position for several minutes, three times a day, relieved many of these while in a few an operation was necessary. The operative cases gave uniformly good results chiefly because such radical treatment was not instituted until all other sources of the trouble had been eliminated except, perhaps, some due to neurasthenia.

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The number of girls suffering from dysmenorrhea in the working force can be greatly reduced by systematic efforts directed toward this end and by the medical staff. Here the nurse and intelligent foreladies can be of greatest assistance—in fact, they must often take the lead in directing the routine measures suggested by the doctor. The first essential is to decrease the number of cases of constipation to a minimum. Next, every industry employing girls should provide the means for healthful recreation, including games which afford plenty of outdoor exercise. Lectures will be found of great value, but better than this is a careful study of each case of dysmenorrhea followed by individual instructions concerning the methods of overcoming it. The nurses can give these instructions by many intimate talks with the girls. Hot drinks, especially those containing certain food value, combined with a short rest in the rest room, will enable many to return shortly to work, whereas medicine given to relieve pain only tends to create a habit.

Following the teachings of certain gynecologists concerning the cocainization of the little tubercles or sex centers in the nose, as a means of relieving dysmenorrhea, I had the opportunity of trying this out in several hundred cases. In those cases showing a marked neurasthenic tendency, remarkable relief was often obtained by this measure. Efforts to relieve them by other suggestive measures were not clearly successful. No relief was afforded in those cases in which some pathologic pelvic condition was later discovered. There were a few cases of dysmenorrhea which could not be accounted for by the nervous state, by constipation nor by any pathologic pelvic conditions which yielded to this form of treatment. It was difficult to explain the relief obtained by some of these cases on any other hypothesis than that of suggestion, and yet there were some cases which seemed to be benefited when the element of suggestion was completely eliminated.

Constipation is one of the commonest complaints among girl employees and plays a very important role in the minor ill-

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nesses causing short periods of absenteeism. In over 1000 consecutive records of working girls, approximately 33 per cent. gave a history of constipation, 20 per cent. of whom were habitually constipated. The easiest course for the doctor to pursue in these cases is to give them a seidlitz powder or a pill, but such a method only serves to increase the trouble. For years I met this problem by giving every employee who complained of constipation a printed diet sheet containing anticonstipation foods, which could be readily purchased at the restaurant or carried in the lunch basket, as well as served at home. In addition, each case was given a prescription for a fruit mixture similar to fig paste.

In one department employing twenty girls I found that 70 per cent. of these suffered from constipation and approximately 50 per cent. had dysmenorrhea. Efforts to overcome these two conditions were concentrated on this group. The forelady secured a table in a restaurant where they could all eat together and insisted on the manager of the restaurant serving the girls with at least two of the articles mentioned in the constipation diet list. She also saw that the girls made up the fruit mixture and used it. In addition, they were stimulated to take plenty of exercise outside of working hours. Within one month the constipation was completely overcome in every case, and within three months the ten girls who had been accustomed to report to the rest room for their sick time or to remain away from their work for a day ceased this practice.

Stomach Trouble. Nausea and cramps and pain in the side not related to the menstrual period are frequent symptoms complained of by girls who have lost time from work or who come to the rest room seeking relief. Girls arise in the morning, hurriedly dress, and because they "don't feel like it," or because they are late, rush off to work without eating. About the middle of the morning they become weak, sick at their stomach and are forced to report to the doctor's office. Usually a little food, a glass of malted milk or a hot chocolate

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furnishes quick relief, enabling them to return to work. On the other hand these stomach conditions, fainting and nervousness, are the commonest manifestations of fatigue poisoning in girls. When a girl reports three or four times with these conditions a careful investigation of her working conditions usually reveals the cause.

Backache is a frequent complaint among girl employees. The majority of these girls have been told by their family physicians, by their mothers or by some well-meaning old lady that the backache is due to inflammation of the ovaries. It is surprising to find how many girls think their backaches are due to pelvic inflammations. A careful study of these cases shows the greater number of backaches are due to causes removed from the pelvis, and the correction of these causes has cured the backache. Judging from the percentage of cures, the commonest causes for backache are badly diseased teeth, infected tonsils, flat-feet, high-heeled and other types of faulty shoes.

From this short *resumé* of the diseases most prevalent among working girls it is evident that preventive gynecology can find a great field for study and development in these health departments of industry.

Medicolegal

The commonest gynecologic conditions complained of by women employees as the result of injuries sustained are backache associated with pelvic disorders, displacements of the uterus, miscarriages in married working women and dislocated coccyx.

A careful study of the various causes for backache will usually clear up this claim, especially when a careful vaginal examination reveals some old pelvic inflammation. In my experience four different girls have gone to women physicians for an examination following injuries followed by backache. In these four cases the women physicians diagnosed dislocated coccyx. Careful *x*-ray examinations and the securing of a competent

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gynecologist or surgeon as an arbitrator resulted in the claim of these four cases being dropped. I have seen two other cases in which coxalgia followed severe falls and were undoubtedly caused by injury to the coccyx. In one of these cases there was considerable pain and swelling in the floor of the vagina.

Girl employees very frequently complain of displacements of the womb as a result of injury. In my experience the commonest causes for these claims are such accidents as falling down stairs or being forcibly knocked down by some fellow employee running through the aisle, by a truck or by an automobile. Practically every one of these claims develops after the girl employee has consulted the family physician; or quite frequently after some woman physician has told her that a displaced womb has resulted from the accident. Often this statement is made by the family physician without a vaginal or rectal examination being made. These girls will complain of severe pain in the back and of painful menstrual periods, both of which "never existed prior to the injury." All such cases should be submitted to a thorough pelvic examination. This should always be done in the presence of the mother or a lady relative and a nurse, and preferably with the patient anesthetized with nitrous oxid. When this has been done I have never found a case which showed the uterus displaced except in two older women, both of whom showed other evidence of a displacement of long standing, such as relaxed vaginal walls, and in one a definite cystocele and rectocele.

Personally I am convinced that a permanent displacement of the uterus never follows direct violence. It is conceivable that such a violence might cause a temporary displacement, but the organ would undoubtedly almost immediately resume its normal position. Pelvic symptoms may follow severe trauma in the region of the pelvis as a result of this temporary displacement, and these must be treated by rest and other means, often requiring temporary disability such as may follow any strain. The only compensation, therefore, which should be paid such cases is for this temporary disability. It

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is often cheaper in doubtful cases to repair the condition, paying compensation for the time lost from work, just as in the case of doubtful hernias, rather than allow the condition to persist with the subsequent claims for permanent compensation.

Recently I was called on an injury case in which the woman employee, aged twenty-eight years, stepped on an object on the floor while at work, causing her to fall. She was not severely injured and was able to finish her day's work and then go home on the street car. That night labor pains developed, associated with hemorrhage, and a few days later she had premature labor, with birth of a five months' fetus. This married woman had been employed only two weeks by this concern—was not examined for employment and naturally blames the fall for the loss of her baby. In the absence of history of other miscarriages and with definite witnesses of this fall it is most probably the cause of the miscarriage. A $50,000 lawsuit is pending as a result of this accident. The employment of married women, therefore, introduces many other factors into the gynecologic problems in industry.

Intolerable and inhuman conditions for our working girls and women still exist in many places. Child labor, with the employment of young girls even before the age of puberty, still persists in many sections of the country, especially in the South. Everyone of you has witnessed the hundreds of prematurely old women who come to the dispensaries of our large cities with relaxed abdominal walls, cystoceles and rectoceles and prolapsus uteri. Many of these are mothers with several children to care for during the day and then are forced to seek a living as scrub-women in our large office buildings at night. Overworked, underfed and underslept these women are leading an intolerable existence in our midst. Hundreds of thousands of working girls are undermining their future usefulness as mothers, and even their ability to become mothers, by working in places in which occupational diseases are rampant because of lack of industrial sanitation. Thus while we can point with

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pride to the accomplishments of industrial medicine and surgery, still there is a great work confronting the medical profession, and the gynecologist of the future will find that he has a very important role to play in these efforts to conserve the nation's man-power and woman-power.

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THE RELATION OF OBSTETRICS AND GYNECOLOGY TO PREVENTATIVE MEDICINE

By Thomas Watts Eden, M.D.
London, England
(By Invitation)

During the great war the people of the different nations involved, men and women alike, had to consider the question of the value of the work they were doing from rather a new standpoint, that standpoint being not its value in pounds or dollars but its value to the state. We as doctors have had to revise our ideas as to the value of our medical work.

The battalion medical officer in the field whose duty was to keep his men fit, to examine their teeth, to keep them clean, and to attend to their small ailments and complaints, was probably doing work as useful to his country as the surgeon performing brilliant operations upon men who were dangerously or hopelessly wounded. I think it is very important we should not lose sight of that lesson now that the war is over. The medical men and women who remained at home were engaged in getting the last ounce of productivity out of men and women who were engaged in industrial pursuits. Now, as I see these lessons, I think they ought to be to a great extent permanent lessons, and it seems to me the time has come when we as obstetricians and gynecologists ought to ask ourselves whether the work that we are doing is as useful to the state as we can make it, or whether it is not. If it is not, then we should try and improve it. Up to the present we have been mainly engrossed with surgical prob-

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lems. When I think of what gynecology was like thirty years ago when I first graduated in the University of Edinburgh, the transformation that has since taken place seems like a fairy tale. When you think of what that great American Marion Sims was able to do, and what can be done in an American hospital today, the story is almost incredible, The same applies to midwifery. Lying-in hospitals sixty or seventy years ago were swept by periodic epidemics of puerperal sepsis, with a mortality of 30 to 50 per cent. Now, we can conduct labor, under hospital conditions, almost without risk to life at all. But I do not think that we can go on immersing ourselves in surgical problems and hospital questions alone.

As regards surgical problems, the limits to which we can go as surgeons have almost been reached. I have seen quite a lot of surgery since I came to your country about ten days ago, and I do not think that the ingenuity, the resource, the dexterity of the American gynecologist can get very much farther. They will have to occupy themselves with some other problems. I think we ought to take a wide view of our responsibility and ask ourselves whether there is not something else we ought to develop than our surgical procedures. I would suggest that we ought to consider ourselves responsible for the care of the health of women and girls during the whole period of their sexual activity and during the whole process of reproduction, and for the care of the special disorders to which they are liable, and for the care of the infants unborn, during birth, and during the first month of its life. There is a great deal in this that is not surgery but preventive medicine.

First of all, I would ask you to reflect on the position of midwifery. As a stranger in your country, I want to make it clear in the things I am going to say that I have no intention of saying anything discouraging about midwifery in the United States, and what I am going to say applies only to England.

I think our hospital midwifery is very good indeed, perhaps

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almost as good as yours is. We have to remember that while gynecology is in the hands of the elect, a few specialists, the bulk of midwifery in the country is done by general practitioners and midwives; 40 per cent. of the confinements which occur in Great Britain are attended not by doctors at all but by midwives. The proportion of women who have their babies under hospital conditions and under the care of specialists is very small, and we find there is an enormous gap between the level of our hospital midwifery and the midwifery of the country as a whole. For every 1000 babies that are born in Great Britain each year, we lose four or five mothers, the greater number young women and healthy. Of this mortality one-third is due to puerperal sepsis, which is a preventable disease. The remaining one-fourth is due to hemorrhage and other accidents of pregnancy and labor which skilled management would reduce almost to a minimum, and which we do reduce to a minimum in our hospitals. If the standard of midwifery were as good for the whole country as it is in the hospitals, we should at once reduce the puerperal mortality about one-half. I suggest to you that this is a condition for which we English obstetricians must consider ourselves, at any rate, partly responsible. It is no good blaming the doctors and midwives because it is our business to train them and fit them for their work; therefore, inasmuch as the bad results they get are due to imperfect training, the responsibility must rest upon our shoulders. The conditions are not exhausted by that statement I have made. We must remember that the mortality figures only show the recorded fatal cases of puerperal sepsis. We have recently begun a system of notification of puerperal sepsis but in the meantime have no reliable statistics upon the incidence of puerperal sepsis. One cannot put the mortality of puerperal sepsis at much higher than 20 per cent.; therefore, we probably have five times as much illness from puerperal sepsis as appears in our case-mortality. This means an enormous amount of invalidism and illness and loss of productive capacity scattered over the whole country.

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In addition, we have got an enormous bulk of minor septic ailments which never get notified at all, and which do not cause death, but lead to the chronic infective conditions that we see so much of in hospitals. This means a further very large bulk of invalidism due to bad midwifery, and then comes, of course, the question of permanent sterility which so often follows these conditions. If we could by any means raise the level of the practice of our doctors, or approach the results which we get in our hospitals, we could relieve the country of a heavy maternal mortality as well as an almost incalculable amount of maternal illness.

Our infant mortality for the first year is somewhere about 100; before the war it was 105. I think it is something to our credit, notwithstanding the difficulties and complications in war times, the mortality for 1919 was the lowest on record, then it fell to 90. Forty per cent. of our infant mortality of the first year occurs in the first month of the first year; that is, something like one-half of the maternal mortality of the first year occurs during the period for which the obstetrician as a teacher is responsible. There is this confession I must make, too, and that is, although the infant mortality is diminishing, as I have told you, the diminution is apparent chiefly in the latter months, and not in the early months, and there is almost no diminution in the mortality of the first month. Therefore, I think the English obstetricians cannot comfort themselves by thinking the conditions as regards infant mortality in the period for which they are responsible are improving to any recognizable extent. I do not know whether such conditions as these prevail in the United States or not. If they do, I hope you will take the same view of it as we are taking, that is, it is our duty to set to work in the most serious way we can to find some remedy for this deplorable condition.

If we begin to ask ourselves what these bad results are due to, we come to the conclusion that they are mainly due to two conditions: The first I have referred to, that is, bad practice following bad training of our students, and second,

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to imperfect hospital provision for midwifery cases. I believe that that latter difficulty is one which you have not with you. My friend Dr. Davis told me the other day there was ample provision in American cities for all obstetric work. That is not the case with us. We have not got sufficient hospital accommodation for midwifery cases, and the result is it often happens that complications during pregnancy and labor cannot receive the prompt skilled assistance they ought to receive, and we are laying down for ourselves this standard that the country should provide for complications of pregnancy and labor as ample hospital accommodation, as it has already provided for surgical complications. In a case of acute appendicitis there is usually no difficulty in finding a surgeon who is competent to operate on it from one end of the country to the other. And so the country ought to equally provide for a serious obstetric emergency by finding some one who is capable of dealing with it the same as a surgeon is capable of dealing with an acute case of appendicitis.

The question of training of students is a much more difficult matter, but without worrying you about this, I should like to say that the principle we are striving to get accepted is this: Medical students should learn the conduct of normal labor and the common obstetric complications in hospitals under the eye of their teachers, and they should be given adequate experience in these ordinary complications before they are turned out to practice. A common requirement of the examining body is that students shall have attended a certain number of cases, and they do not much mind where they attended them. The student ought to be taught the conduct of normal labor as a surgical procedure in hospitals and by properly qualified and experienced teachers. I do not think there is any clinical subject in the whole curriculum of more importance from the point of view of the public welfare than the training of the student in the conduct of normal labor. He can learn, if he likes, how to do a gastro-enterostomy, but he wont do it for many years after he is

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qualified, but he will have to attend confinements within a few months after the time he puts up his plate, yet he is taught this important task which he is certain to have performed in a more inefficient manner from a clinical point of view than any other. If we could get these two matters put right we would go a long way toward improving our bad record as regards maternal mortality.

As regards the infant, we now have a network of infant welfare clinics all over the country which are utilized for the training of medical students by pediatric physicians, and very good work is being done in this way in teaching the care of the infant in the period of its life in which it stands most in need of scientific care.

There is one other point I would like to make. I do not think our midwifery hospital results are as good as they might be with regard to the baby; that is, the infant mortality of labor in most lying-in hospitals is larger than it ought to be.

One of my friends in London (Dr. Eardley Holland) has been making a series of investigations on dead babies, that is, babies that died during the birth process. It is a piece of research work done under the auspices of the government. His paper has not been published yet, but I have his permission to quote from it. He examined 168 dead babies, as they came from maternity clinics in London and in some other English towns. They were all labors which had been attended with a reasonable degree of obstetric skill. I do not think any higher claim than that can be made for them because many of them were delivered by interns, and not by the active members of the hospital staff. Fifty per cent. of the babies died from intracranial injuries as proved by post-mortem examinations. The injury, as a rule, consisted of a laceration of some portion of the membranes of the brain, followed by hemorrhage.

Dr. Holland had a certain amount of evidence, too, that minor injuries of this sort occurred from which babies recovered. They died sometimes of some other intercurrent

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condition during the process of healing of the laceration which itself is not fatal. So the suggestion is that there is a great deal of cranial injury done even by skilled attendants in normal labor in lying-in hospitals. Some of these cases were forceps cases, some breech cases, some were cases of normal delivery, but all of them showed these injuries.

Now, this is going to give us cause for much searching and much examination of the methods we are employing, because it is not only the question of babies that die of these injuries, but we have got to reflect on something behind this. It is possible cortical injuries may occur in these conditions, not sufficiently serious to endanger the life of the child, but serious enough to cause permanent results as regards the nervous system in later life. It is only by a prolonged system of follow-up that such a question as that can be answered, but it is a disquieting situation and one which we at home are taking seriously to heart.

Now, one or two words about the gynecologic question. As regards gynecology, I should like to make the suggestion that we perhaps have not paid sufficient attention to what is a very important period of a woman's life, and that is the period of secondary sexual development. Primary sexual development, of course, occurs *in utero*. If anything goes wrong then the result is a gross developmental defect. Secondary sexual development is reached at puberty when the girl becomes a woman. There is a great deal of evident disturbance during this period which results in functional disorders of various kinds in the female sexual organs.

Some interesting observations were made sometime ago by Malcolm Campbell, of Edinburgh, who showed that an arrest of development of the uterus in rats could be produced by improper feeding. I think we should take into consideration the question as to whether we ought not to cause some systematic inquiries to be made into the effects upon the future sexual health of the girls, of the conditions under which they live during the time of their secondary sexual development. For instance, there is a disorder we know by

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the name of spasmodic or primary dysmenorrhea. We do not know what it is due to. We do not know what to do with it really. We do a number of small operations which are more or less successful or unsuccessful, as the case may be. It is curable by natural processes in the majority of cases, but difficult for us to cure. It is quite possible it is the result of some defect or deflection of the course of secondary sexual development. Medical sociological observers could settle such a question by undertaking a wide review and getting specific classified returns from large centers of education where girls of all ages and all classes can be observed. The results arrived at from that work can be classified and some important and valuable information may be obtained in that way, which might enable us to find some means of preventing the occurrence of this disorder, which causes so much sickness, suffering and loss of work among the women of our country.

We have got to remember how the status of woman is changing. The old idea that a woman is a delicate creature to be protected in time of danger and distress has quite gone by. I should be sorry for the American or Englishman who suggests to any of his lady friends that is their proper role. They are taking their places with men in every walk of life. They are in the professions; they are in business. During the war they put on trousers and did the work that men are usually employed to do. There is probably little they cannot do as well as the men; sometimes they do it better. Their only handicap is a physiologic one, and it is for us to educate the state, to inform the state on the subject, so that women shall have the fairest chance possible in the struggle that lies before them. These are very large responsibilities, and if we are going to undertake them, we shall have to revise the character of our ideas of the work which gynecologists and obstetricians ought to pursue, and I make the suggestion to you in the hope that we may agree that the task is one which is worthy of our attention, and one which it is our duty to attempt.

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DEVELOPMENT OF PRENATAL CARE AND MATERNAL WELFARE WORK IN PARIS UNDER THE CHILDREN'S BUREAU OF THE AMERICAN RED CROSS

By Fred L. Adair, M.D.
Minneapolis, Minn.

Prenatal or antenatal care is that part of a public health program which has as an ultimate object the beneficial influencing of the health of the offspring by surrounding the mother with proper conditions during the period of pregnancy. It is virtually inseparable from that part of a maternal welfare program which has to do with the safeguarding of the health of the prospective mother during gestation. These are combined with another part of the maternal and infant welfare plans which deals with the proper care of mothers and infants at birth and during the lying-in period.

It seems logical to consider the so-called prenatal or antenatal care which deals with the future offspring and prospective mother during the period of gestation as the natural connection between maternal and infant welfare work. It might be well to summarize briefly what the author understands by a maternal welfare program in relation to public health work, especially in relation to that dealing with the care of infants.

Brief Statement of the Fundamentals of a Maternal Welfare Program. Any complete health and social welfare program should include two public welfare activities, viz., maternal and infant welfare, which are closely related and

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should be very carefully coördinated. These activities are intimately bound up with the family and concern particularly the mother and child. While these two subprograms are more or less closely related to all the other public welfare work, they have more points of contact with each other than with the rest of such activities. From an administrative viewpoint these two activities could be comprised in a maternal and child welfare program, but from a medico-social standpoint the work should be handled by experts in the different lines of work.

The contact between these two phases of work may be termed "prenatal or antenatal care." This implies care of both the prospective mother and child. It should be supervised by a doctor with helpers who are especially competent to direct and to deal with the problems of "prematernity." From the viewpoint of infant welfare workers the results to be obtained from this care of mothers are: (1) The lowering of infant mortality, especially the early mortality; (2) the lessening of morbidity to the lowest possible level; (3) the handing over of a healthy child as early in its life as practicable, with its mother able and fit to care for and nurse it, to a doctor who is competent to deal with the many problems of infant life. The elaboration of this program of infant and child welfare may be left to those who are more competent to pass on this phase of the work than I am.

Prenatal work is a small part of the maternal welfare program, for the latter involves many activities of various kinds. It comprises so many kinds of work and thought which are related to all sorts of welfare ideas and plans that it is undesirable, if not impossible, to carry out the complete program except as a part of a comprehensive general plan.

The objects of the maternal welfare program are: (1) To develop healthy parents, especially mothers who are intelligently trained; (2) to bring them through life to maturity capable of having and rearing normal children; (3) to reduce the maternal, fetal and newborn morbidity and mortality to the lowest possible level; (4) to leave the mother with a desire and capacity to bear and rear children properly in a sufficient

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number and of such a quality as not only to maintain the integrity of the human race but to constantly improve its character.

This implies the improvement of the individual by bettering his antecedents and by protecting him from the folly and ignorance of his progenitors. It means the study, investigation and application of principles which will remove conditions affecting future generations badly and creating those which tend to improve the offspring.

It is desirable that in the dependent stage of their lives individuals should be so cared for that they will pass through infancy, childhood and adolescence into maturity with minds and bodies as nearly perfect as possible, and so trained as to be able to give their offspring the best possible care, besides transmitting to them a legacy of sound body and mind.

Parents should have good antecedents, a good environment, be properly reared, educated and taught not only in the care of themselves but of those for whom they are responsible and with whom they are associated in life.

This suggests the next phase by which we seek to protect individuals from the acts of others by means of certain laws and regulations affecting their conduct. In this way the health and welfare of the community are conserved. This is, of course, part of a general welfare legislative plan, but there are many special problems which affect women, and especially prospective mothers, which have to be very thoroughly understood and carefully worked out. It must not be forgotten, however, that all public welfare work, while it has definite and concrete results on the existing generation, has a more permanent effect on future generations and is therefore intimately associated with problems of heredity (which are really a part of a large maternal welfare program).

The family should be protected from various detrimental influences by education, legislation and proper help and advice. This means that each family should have a normal economic status, proper housing, etc., good sanitary surroundings, proper advice and care in case of physical or other needs resulting from disease, economic reverses or distress of any kind. Some

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of the medical problems which vitally affect the individuals and the family are those dealing with tuberculosis and venereal diseases. These activities are very closely allied to maternal welfare work.

A comprehensive maternal welfare program should include investigation into certain medical and social problems. This virtually constitutes a study of many problems connected with the production of human life. Some of these medico-social problems which vitally affect the individual, the family and the community are those relating to sterility, whether apparent or real, to abortion, to premature births and still-births, whether *antepartum* or *intrapartum*. A study of causes and methods of controlling promiscuous sexual relations and from a medical standpoint investigation into methods of eradicating venereal diseases is of the utmost importance in any maternal welfare scheme.

An analysis of the causes and practical application of the principles for preventing the development and transmission of degeneracy, insanity and physical defects would be of great benefit to the human race.

A careful and unbiased study of the causes of economic insufficiency of the family, with its disastrous effects on the mother and children, is one of the fundamental problems of maternal and infant welfare. An investigation of the causes underlying the diminishing birthrate resulting from increasing sterility, abortions, desire to limit the size of families, etc., is of prime importance to many countries.

These are some of the many important problems with sociological and medical bearings which have a close relationship to a maternal welfare program.

It is necessary that some fundamental principles, definitions and plans be established for this sort of work in different countries. This is especially true when statistics are used and particularly when they are used for comparative purposes.

Of medical problems which need special investigation there are many. Practically all conditions which complicate pregnancy, labor and postnatal conditions in mother or child need

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further study. Many of these are practically unexplored fields. Of the cause of eclampsia we are ignorant. We know practically nothing of physiology and pathology of the child developing *in utero* and the effect of maternal environment, habits and diseases of the fetus.

The educational program involves the education of adolescents along proper sex lines. This necessitates careful study and thought in laying out the educational program as well as in selecting those who are to give this instruction. It includes the education of prospective fathers and mothers in the physiology, hygiene, pathology, psychology, sociology, etc., of maternity and infancy.

Of the highest immediate and practical importance is the proper education and training of those who give prenatal, natal and postnatal care to mother and infant. This includes doctors, midwives, nurses and social workers and the institutions which are responsible for their training.

The legislative program includes those laws which are designed to protect the family unit in health, economic independence and happiness or to prevent any invasion by medical or social disease. This means, of course, the protection of motherhood and infancy from disease, poverty and distress. The mother must not be forced into conditions of existence which will be detrimental to her or her future child. This means provision for proper maintenance, good living conditions, protection from disease, improper work, etc. Laws should protect the unborn child from death, disease and harmful influences, in so far as this can be accomplished. Legislation should provide for the license and proper inspection of institutions and individuals to whom the care of mothers and babies are entrusted. There should be some assurance that they are properly trained and capable of carrying on their work.

Some provision must be made for the necessary institutions which include, in addition to the educational institutions for training, special workers, others such as special medico-social centers, in connection with communal activities. There should

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be close association and coördination between the medical, social and educational work in these centers from which all medical and social activities in a given area should emanate.

Maternal and infant welfare activities make up an important part of the work. Of the work of these two groups, the "prenatal" and "nourrisson" clinics should be most closely coördinated.

Maternal welfare work should include some institution for the education of prospective parents, especially the mothers, to whom talks and demonstrations give the necessary knowledge of themselves and their babies. Home visitors should go from these centers to the house in which the women can be advised and taught in their own homes.

Provisions should be made to furnish proper prenatal, natal and postnatal care in the home for both mother and the newborn.

There must be adequate and proper provision for prenatal, natal and postnatal and other necessary medical, dental, nursing and social care, including domestic economy and dietetic and nutritional work. It is necessary to have prematernity homes and hospitals as well as maternity and gynecological hospitals. Postnatal homes are necessary for those who need care for medical or social reasons. Public welfare activities are so intertwined that it is impossible to isolate one from another, but there is not a more basic work in the whole plan than that of maternal welfare. The mother is the keystone of the family unit and the whole arch of human welfare and progress is sustained by the weight which rests from all sides of that keystone.

Both maternal and infant welfare work are of the greatest importance in any country, but for many reasons they have been and are especially important in France. In practically all countries the infant and child welfare programs have been developed more quickly and thoroughly than that of maternal welfare, and of late have included more or less of the problems of maternal welfare. This is especially true in the United States.

The very praiseworthy activity of physicians and other wel-

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fare workers who have made a special study of infant and child life is largely responsible for this. The natural appeal which the infant and child make to all has contributed very greatly to the success of their work. This should not lead us to neglect the more abstract and less tangible but none the less great results which may be derived from a properly worked-out plan of maternal welfare.

This work is especially important for France because of the low and diminishing birth-rate, the high percentage of sterility, the large number of abortions, the great number of stillbirths and high infant mortality, especially in the first two weeks of life.

The frequency of venereal diseases and tuberculosis makes the early observation and careful study of all pregnant women of the greatest importance. Prof. J. M. Slemons, who studied the obstetric situation in France, and made his report to the A. R. C. October 1, 1917, stated, among other things, that "thoroughgoing antenatal supervision, nevertheless, is a requirement of the very first order in France." Dr. De Normandie, in his report, made less than a year later saw the advisability of establishing prenatal care in France.

In September, 1918, the author was asked by Major W. P. Lucas, head of the Children's Bureau, to investigate the obstetric situation in Paris, with special reference to prenatal care.

In this report it was stated that "the great need is for social work in connection with the maternity hospitals and that the establishment of properly conducted prenatal work would be the greatest boon to the mothers, to maternity hospitals and to France. It is not necessary to discuss the value of prenatal work as a general proposition, but there are certain conditions in France which would make the establishment of such a work of more benefit than almost any other thing which could be done. The machinery for carrying on this work in Paris is already partly constructed but needs to be properly adjusted and supplemented."

"What is needed to perfect this system is closer contact with

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the patients and careful study of their actual home and economic conditions, not *en masse* but as individuals. Mothers should be treated with the greatest possible kindness and consideration, for they are the ones who make the greatest possible sacrifice for the benefit of others."

Aside from this appeal for the sympathetic and intelligent care of prospective mothers, certain statistics were cited showing some important points of attack in the effort to conserve human life.

It has been estimated and openly stated by publicists that there are now about 500,000 abortions annually in France. This exceeds the present number of living births. The number of women who enter hospitals for treatment of complications resulting from abortion is constantly increasing.

In Paris during 1912 there were 4220 still-births, which practically equalled the total number of deaths during the first year of life.

In France during 1912 there were 742,435 living births and 34,695 still-births. The deaths during the first fourteen days of life were 19,265, making a total of 53,960 deaths, most of which may be regarded as due to prenatal and natal causes. The remaining number of deaths during the balance of the first year of life amounted to 59,098.

The ravages of venereal diseases on both mother and offspring, the high mortality of tuberculous women who are pregnant and the dire effect on their offspring make the detection of these diseases early in pregnancy of paramount importance.

The detection and treatment of other diseases, accidental and incidental to pregnancy, are, of course, of the very greatest importance.

The relief of social distress and disease is not less important than the cure of physical ailments and diseases. The happiness and well-being which can be brought to the individual mother and those associated with her by intelligent guidance, sympathy and help are unmeasurable.

Perhaps the objects of this work may be concisely given by translating an outline which the author used as a means of interesting some of the French people in carrying on the work.

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The raising of a fund was asked to establish and develop:

1. Medico-social work in connection with the maternity services of the hospitals of Paris.

2. Medico-social consultations for pregnant women in sections of Paris remote from the maternity hospitals.

3. Consultations for pregnant women in close association with the consultations for nurslings.

The aims of the work shall be:

1. To educate the prospective mothers how to best care for themselves and their families.

2. To develop their social and economic independence.

3. To give them moral support and assist them to obtain material aid when necessary.

4. To see that they take proper precautions to prevent and cure disease.

The results which may be attained are:

1. An improvement of family life.

2. A diminution in maternal and infantile morbidity and mortality.

3. A decrease of venereal diseases, abortions, still-births and premature births.

4. An increase in the number of pregnancies and normal births.

5. Finally, by study of the medico-social causes of depopulation, to reach a thorough understanding of the causes and at the same time the method of remedying these conditions.

PLAN OF WORK AS PUT IN OPERATION. In September, 1918, after the investigation of prenatal care mentioned above, it was necessary to leave Paris to carry on some emergency war work, so that no further steps were taken until the latter half of December, when after some necessary preliminary arrangements the prenatal work was begun in the fourteenth and nineteenth arrondissements, and a little later in the Municipal Dispensary at Bicetre, where established clinics for nurslings and children were being conducted under the auspices of the Children's Bureau A. R. C. The general idea of the work was to get in touch with as many of the pregnant women in the

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community as possible. The contact was to be from both medical and social points of view in the consultations and the home as well.

It was not thought possible nor advisable to attempt a large or complete work of maternal welfare, so certain definite objectives were determined. These were from a medical point of view:

1. The making of consultations for pregnant women easily accessible to them.

2. The establishment of a different type of consultation for pregnant women where the women would be periodically observed by a well-trained medical man and not by a "sage-femme."

And also from a social point of view:

1. The demonstration that those who occupy a low social and economic level have other needs than spasmodic material relief and that such relief should only be given after proper investigation and study of their needs except in emergency.

2. The proving of the possibility of entering the homes of these poor people not only to study but also to help their morale and give such material aid as might be necessary. Many of the French people, especially those of the better economic and social class, have been very skeptical of the idea of home visiting.

3. Instilling the idea of coöperation and coördination in their relief work both medical and social.

The essential features of the plan were:

1. Medical supervision during as great a part of pregnancy as possible to prevent the occurrence of disease or detect its presence early and to improve the health of the patient. This is accomplished by demonstration of proper diet, clothing, personal and home hygiene and securing of as good environment as possible, and the use of appropriate curative measures for physical and social ills.

2. By giving of social care, including a study of all the problems which are not medical, with the object of raising the mother and, as a result, the family to a higher level of living. This is done by talking over their problems and giving advice

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and help in avoiding and solving their difficulties. They are visited in their homes and their needs are investigated with the desire to see that they secure material relief when it is necessary, but always with the thought of showing them how to be independent and solve their own problems wisely.

They are especially helped to understand maternity and infant care. This is done by individual instruction and advice, also by getting them together into groups where they can be instructed in making the proper clothing for themselves and babies, in the necessary preparations of themselves and their homes for the confinement and the proper care of the babies. They are also taught how to improve their individual, family and home surroundings, especially in regard to food and hygiene.

3. To follow up the cases after confinement and see that both mother and baby are maintaining proper health under as good living conditions as possible.

The details of the plan are the establishment and maintenance of prenatal consultations in quarters in which no consultations for pregnant women are easily accessible to them. These centers must have provision for both medical and social supervision of the cases at the consultation itself and also in the home. In other words, there must be a connection between the consultation and the home of the patient by some plan of home visiting and instruction.

Advice, help and instruction may be given to groups of mothers in regularly conducted classes in which instruction along various lines may be secured by them.

In an effort to reach every pregnant woman of the quarter as early in pregnancy as possible and see that she received proper care and instruction, not only for herself but later for the baby, contact was made with the "mairie," with institutions which care for mothers and also with those who care for the mothers in their homes.

A pregnant woman should be followed with care through her pregnancy and confinement and should later be guided into the consultation for nurslings and postnatal consultation. All

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this should be done not only for the benefit of the baby but also to keep her under observation to make sure that she is able to care for herself and her family in the best possible manner.

The prospective mothers were found by (1) securing from the "mairie" a list of those who applied for the "allocation;" (2) establishing a "liaison" with the maternity hospitals of the neighborhood to obtain the names of the women registering in their consultations who lived in the quarters in which the prenatal work was being conducted; (3) developing friendly relations with the "sage-femmes" of the section and helping them to give their patients better care; (4) reference of cases from other consultations as that of the Rockefeller Commission for Prevention of Tuberculosis and those of the Infant and Child Welfare work; (5) the bringing of one woman to the consultation by another; (6) accidental contact with the home visitors.

INSTRUCTIONS FOR PRENATAL WORKERS. The following ideas and instructions were given by the author to those who were engaged in carrying on the prenatal work.

It should always be remembered in caring for pregnant women that they are worthy of all the help and consideration that can be bestowed upon them. They are often very uncomfortable, with symptoms incident to their condition and frequently their mental and moral outlook is changed.

It should never be forgotten that one is dealing with a person who has as many or more human rights than any other person, and that there is always potentially a second individual whose rights cannot be ignored from any point of view. It should be the aim of those who care for the pregnant woman to understand all the factors which interfere with her living in good health and happiness and which may interfere with the life, health or happiness of her offspring.

We study disease in the individual to understand her exact condition and thus be able to use the best means to prevent and cure the particular affection of the individual. We treat a patient with typhoid fever to cure the individual, but we also look for the disease in others in order to find the source from which the disease arose. Many times it is very difficult, if not impos-

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sible, to discover the origin of diseases from the study of a single case; it is therefore necessary to study groups of similar cases in order to find the source and the cause of the trouble. We are then in a position from which we can attempt to prevent the reoccurrence of this disease not only in the individual but also in groups of people. This we call preventive medicine.

In social work we try to discover the causes of social and economic distress in the individual and seek to apply the remedy. It should always be our aim to discover the source of trouble for groups of people and to strive to remove the causes.

In medicine it is impossible to control the spread of disease by dealing solely with individuals; it is absolutely necessary to understand and remove the causes from communities afflicted with the disease. We have to treat cases at the source *en masse* to control the spread of disease. In society it is not possible to deal solely with the individual in removing social distress, the causes must be discovered, the source found and the trouble removed from groups if the work is to rest on a permanent foundation.

It is only by understanding the causes and removing the sources of trouble that society will ever be able to exist constantly and relatively free from either disease or social afflictions.

The purposes of all medical and social work are not only to study and relieve the discomfort and suffering of the individuals themselves, but also to investigate and ultimately discover and eradicate the causes of these conditions in society as a whole. In order to carry on this work systematically it is necessary to have some record of the study of individual cases. It is, of course, possible to have records so elaborate as to defeat the immediate objects of the work. The ideal record should comprise only the absolutely essential information and only such items as can be secured with relative accuracy. They should be elastic enough to fit the needs of most cases and at the same time simple enough to be easily understood. It should be possible to compile data from these easily and thus obtain a study of groups from the information on the records of individ-

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ual cases. In this way some of the ultimate causes and sources of difficulties may be found. The workers should never forget that records are in themselves not the object of their work but are simply a means to an end. They serve as an outline to be followed intelligently, as a memorandum of the individual case, and ultimately as a means of finding the cause and getting at the root of existing conditions.

Some explanation of the prenatal records, including the social histories, an idea of their purpose and an explanation of the information contained on them, may be necessary.

After registration at the consultation the patient was given a card to be enclosed in an envelope and retained by her at all times. The information on this card was the name, address, registration number and date.

The place of confinement was indicated and who was to care for her, the date of her last menstruation, of quickening and the probable time of confinement was recorded, any incidents of pregnancy were noted, the number of previous pregnancies was recorded and any important complications stated. Findings of importance were mentioned, the character of the pelvis, the condition of the urine and blood-pressure were briefly given. The patient was not only supposed to bring the card with her to the consultation but also to show it to her attendant at the time of her confinement, so that the information secured at the prenatal consultation would be available for use by the obstetrician or midwife. Her attendant was asked to supply certain facts which were to be recorded on the card as the date of confinement, the place and any complications. The sex, weight, length and feeding of the child were noted on the card. The patient was supposed to bring this information regarding herself to the postnatal consultation and that concerning the newborn to the clinic for nurslings. The card also served to remind the patient of the date on which she was to return to the consultation.

The purpose of the card described above is, of course, apparent, and it is not as elaborate as might be inferred, for the really important information regarding the case can be given

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in very few words. It is extremely important that the work of these different agencies be closely coördinated and that a certain minimum of information regarding the case be passed along with the patient.

The social card gives an outline for the study of the living conditions of the family, *i. e.*, an investigation of the members of the family and their habits and environments. This chart should be finally filled out after the worker has confirmed, in so far as possible, by personal observations, the statements made by members of the family. It may require many visits and much tact to secure the required information. Much of it can be secured without direct questioning by conversation and observation.

This chart is divided into five parts: (1) A study of the personnel of the family and those closely associated with them. (2) An investigation of the work of the different members of the family. (3) The observation of the housing conditions, which is extremely important because it has much to do with their comfort, health and happiness. The accessibility of conveniences and necessities, such as light, heat and water, including plumbing, and the general sanitation and crowding of occupants are very important facts to ascertain. (4) An analysis of the monthly expenditures of the family. (5) A record of the monthly revenue. The last two deal with the economic and financial condition of the family. This is a very delicate subject, but, nevertheless, extremely important, as it affords opportunity for making a partial diagnosis of many social afflictions. For instance, two families of the same size may be living in practically the same surroundings and both expending all of their income. One may have 50 per cent. more revenue than the other, but through poor management or carelessness be reduced to the same economic level. Such a family should be taught how to live better—at least the rising generation should be shown how to improve their condition and not fall into the same errors. Another family, at one time independent, through misfortune, such as sickness, death or loss of money, may be forced below their previous economical level. We could term

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such a class a marginal group because they live so close to the income necessary for independent living that any mishap or mismanagement reduces them to a financial condition where life becomes a mere struggle for existence. Another family may never have risen above the level of struggling for existence. It may be possible to correct their condition by placing them in work of which they are more capable. It may be possible to alleviate their condition only by rendering assistance. It must never be forgotten that many of these afflictions are due to social and economic conditions which can be changed only by applying the remedies to larger or smaller groups of individuals. It is important to analyze the income and expenditures with reference to each other and to the different items making up the budget. It is perfectly possible to spend such proportion of the income on food that the family is forced to live without other necessary or desirable things, when, with a much smaller expenditure, the family would be just as well nourished.

The medical records consisted of two cards: On one the history and results of physical examination were recorded. The information on this chart comprised the past history of the patient and her family, information of all previous pregnancies and labors, a history of the present pregnancy besides the record of a general physical examination as well as an obstetrical examination.

The other medical card was used for recording routine observations each time the patient returned. It was so arranged that this information could be written under the proper date in parallel columns. It comprised such information as the temperature, pulse, blood-pressure, urinary findings, edema, etc.

One other card was used for the reference of cases to other agencies. The necessary information was given on this card and space was left for making a proper report back to the consultation.

The workers were taught to use these charts, but some difficulty was encountered because of the short time which we had to train them and also on account of some unavoidable but rather frequent change in personnel. On the whole they served their purpose very well.

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After registration and taking the social and medical histories the patient was examined physically.

A certain routine was established in which all patients coming for the first time were given a complete physical in addition to the obstetrical examination. Any patient pregnant for the first time, or who gave a history of abortions, still-births, or specific symptoms, was sent to the laboratory for a Wassermann test. Any case subjected to tuberculous contact or presenting suggestive symptoms was sent for a special chest examination. Cases giving evidence of other diseased conditions were sent where they could receive appropriate care.

Cases were told to return at least once each month during the first seven months of gestation and once each week after that period. In case they failed to return the home visitor was asked to trace them.

The routine followed on each return visit was to secure the patient's weight, temperature, pulse-rate, hemoglobin, blood-pressure and urine for chemical and microscopic examination. On each return visit certain questions were asked regarding her general health and a cursory physical examination made. At the beginning of the last month of pregnancy an obstetric examination was made in all cases. Vaginal smears were not made and examined as a routine, but only in those cases which were regarded as suspicious. Special study and care were given to those cases which presented conditions which needed it. Postpartum examinations were also made.

Social work was established and carried on in the sections of Paris, as will be enumerated, and also in four of the maternity hospitals. Medical work was conducted in conjunction with the social work in the prenatal consultations which were established in the different arrondissements, but no medical work was undertaken in the hospitals nor was any attempt made to modify the routine of obstetric work established there, though it failed to meet the ideals of any up-to-date clinic for pregnant women. It was not thought to be tactful or proper to criticise or suggest too vigorously to men who for nearly five years had been driven to heroic actions to meet the demands of military medicine and surgery.

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Social work was established in four of the maternity hospitals, and the author feels very strongly that it will be the beginning of a work which will be most vital in the future development of France which has had and still has the most serious problem to solve in reference to natality.

It may be of some interest to give a brief summary of the work and some of the immediate results.

In the 19th arrondissement, where prenatal consultations were being conducted, a visiting nurse was sent to the maternity services of Tenon and Lariboisiere Hospitals once each week to get in touch with those women who went from the 19th arrondissement to the consultation of those hospitals.

We tried to see that the mothers who were to remain home for the confinement made the necessary preparations and had the material necessary for the confinement.

In the social center directed by Miss Frances Stern we had a class once each week in which mothers were shown patterns of things necessary for them and their babies, taught how to care for themselves and a baby and given more or less personal instruction. The women were also sent to food consultations conducted by Miss Z. M. Harris and to mothers' classes.

Any cases suspected of accidental diseases, such as tuberculosis and venereal infection, were sent to special consultations for both diagnosis and treatment.

Those women who presented any obstetric complications were sent to maternity hospitals for special care.

The work was carried on in close coöperation with that of the Rockefeller Commission for the Prevention of Tuberculosis and also with the infant and child welfare work of the Children's Bureau A. R. C.

Every mother who had a living baby returned to the "Nourrisson" consultation. Three consultations were carried on each week—one at 9 rue Edouard Pailleron in the "local" of the Mutualite Maternelle, another at 28 rue l'Argonne and a third at 2 rue des Mignottes.

The nursing and visiting work was carried on by Mlles. Oelker and Durrleman under the supervision of Miss Nellie Reed,

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of Washington. During the six months about 200 pregnant women were taken care of in the prenatal consultations of this arrondissement.

The consultation at Bicatre was carried on by Dr. Lantz once each week and a rather loose connection was established with Baudelocque Maternity.

In the 14th arrondissement the work was carried on at the Union Maternelle et Infantile, 2 rue de Moulin Vert once a week and at rue Dareau twice weekly. The home visiting was at first under the charge of Miss M. McAlanny and later was supervised by Miss N. C. Rudd, who did most excellent work. The same general plan was carried out in so far as possible in the absence of a social center and a less complete infant and child welfare organization than that in the 19th. Over 200 cases were seen during a period of less than six months.

In Bicetre the work was taken over and carried on by the municipality. In the 14th arrondissement the Patronage Franco-Americain, in close connection with the Mairie, arranged for a continuance of the work. An "oeuvre" was formed in the 19th arrondissement to carry on the whole plan of the work as established there. The name of this organization is "Pour l'Enfance et la Famille par l'Aide Sociale."

May 1, 1919, social visiting work was established in four of the maternity services. In Baudelocque it was carried on under the leadership of Miss N. C. Rudd with the help of Mlle. Nageotte. The work was established and conducted in St. Antoine Maternity by Mlle. Oelker, while that which had already been started at Tenon and Bariboisiere was continued under Mlle. Durrleman.

The plan of the work in the hospitals is as follows:

I. Social Service at the Consultations

1. Inquire of each patient what can be done to help her.
2. Inquire about the doctor's prescriptions and whether the woman knows how to and is able to have them carried out.
3. Find out whether she knows what to prepare for herself and her child and see that she does it.

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4. Follow up and see that she attends the consultations as often as she should.

5. Supply her with the needed help and check it up by the "Fichier Central."

6. In places where a visiting service exists (14th and 19th) give the names and addresses of pregnant women to the "visiteuses" with the necessary instructions. A report should be returned concerning housing and living conditions and should be sent to the hospital.

7. In the other arrondissements make the necessary visits in as great a number of cases as possible. Follow especially the important cases.

8. Coöperate with existing "oeuvres."

II. Social Service in the Hospital

1. Visit the wards; keep in contact with all the "accouchees" and give them the social help needed for them to adapt themselves to their new problems. Help those who are going out and see that housing and hygienic conditions are as good as possible. Follow them up, help them to take up a normal healthy life and see that they bring their baby to the "consultation des nourrissons."

2. Organization of practical talks for future mothers, either frequenters of the consultations or who have been admitted to the "expectant" wards on how a pregnant woman should dress; how to prepare the layette; practical demonstrations of care to be given to the newborn baby; practical lessons in personal hygiene; how to improve the hygiene of the house, etc.

An organization was formed to carry on the "medico-social" work which was installed in the hospitals. The name of this organization is "Service Medico-social des Maternites."

The author feels constrained to mention by name some of those who contributed by advice and coöperation to the success of this work. The names of some of these have been mentioned above and will not be repeated.

It was a great pleasure to have the help and coöperation of

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the men at the head of the maternity services of the hospitals mentioned above and of those associated with them. The seed which has been planted will be sure to grow and bear fruit under the attention of such men as Profs. Couvelaire, Bouffe-Saint Blaise, Demelin and Funck-Brentano, with the able help of their associates, Drs. Sellet, Desvraigne and others. The help of Maire Brunot, Drs. Le Sage and Broudic and Mlle. Chaptal was greatly appreciated, and it would have been impossible to have developed and carried on the work in the 14th arrondissement without their help.

The author was also helped greatly by the advice and encouragement of Drs. W. P. Lucas, R. S. Haynes and T. B. Cooley as well as by the coöperation of Dr. W. J. French, who had charge of the infant and child welfare work in the 19th arrondissement. There were many others, among whom might be mentioned Madame Getting, Miss Asche, and Miss Ellen C. Babbitt.

In closing, it may be well to remember that this work was carried on in a foreign land and that if it has achieved any success it is only through the sympathy with and toleration of Americans and their ideas by the French people themselves.

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THE IMPORTANCE OF A FOLLOW-UP SYSTEM FOR OBSTETRIC PATIENTS

By George W. Kosmak, M.D.
New York City

In these days of "health-conservation measures" the question may well be asked whether the recently delivered mother in either private or hospital practice is accorded as much attention in a follow-up sense as a patient recovering from medical or surgical illness. It is now commonly regarded as essential to the proper functioning of a hospital that each patient be kept under observation during a definite period after discharge and to report for examination at stated intervals or be visited by the social service worker. Thus not only the immediate but the later results of treatment are known and can be acted upon. In surgical cases, particularly, the final physiologic, as well as the anatomic, outcome of the particular operation is insisted upon as a matter of record and study. Does this development in modern methods apply with equal force to obstetric patients? Is the proper care extended for a sufficient length of time after delivery to obviate the possible production of pathologic lesions and to provide for their correction if noted? Laudable and constantly increasing attention has been accorded by maternity institutions to provisions for antepartum care, both for the sake of the mother and her unborn child. A thorough physical examination of the prospective mother is urged, and with blood-pressure observations, urinalysis, pelvic measurements, etc., is regarded as essential in every well-ordered maternity, But once the interest and excitement attendant upon delivery

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are over the patient in many cases is discharged with the cursory examination at the end of a stated period and little more attention paid to her. This also applies in many instances to private patients. There is no reason why this condition of affairs should be allowed to exist. Although accepted as physiologic, the process of parturition verges so closely upon the pathologic that it is often difficult to draw a line of demarcation. Moreover, the process of involution is by no means complete when the patient is able to be out of bed, and complications may develop and escape notice if a pelvic examination is not made after the usual period of two weeks in the hospital. We may briefly inquire at this point into these possibilities and then discuss means for their correction. The usual method of postpartum examination when it is conducted takes note of the breasts, the degree of uterine involution as determined by the lochia, the size of the uterus, its consistency and mobility, the state of the adnexal organs and the condition of the cervix and perineum. If the results of this examination are fairy satisfactory the patient is ordinarily discharged and in many cases not seen again unless complications develop. Let us consider these points somewhat more in detail, although we may be accused of dealing with trite and elementary facts.

The involution of the uterus, as already stated, is usually gauged by the size, consistency and character of the lochial discharge. Ordinarily the bright red lochia should disappear after the eighth or ninth day, but inquiry will often elicit the fact that in a great many cases the bright discharge reappears after the patient has been up for several days. A bloody discharge means a halt in the process of uterine involution and above all requires rest in bed with the possible administration of oxytocic measures. A considerable amount of blood may be lost, unless this condition is promptly checked, and not only does the patient suffer from this, but the congested uterus is more liable to be displaced either downward or backward. As concerns malposition of the uterus, we often find an apparently normal anteversion at the end of ten to twelve days converted into retroversion if the patient be examined again four to

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six weeks later. This is usually accompanied by enlargement and congestion, which have probably contributed to the displacement. If appropriate measures are not immediately instituted involution is further retarded and the uterus may remain permanently in this abnormal position. At this time postural treatment is indicated, including the knee-chest position, the so-called kangaroo walk and having the patient avoid lying on her back. The bowels must also be kept open and oxytocics administered to reduce the size of the uterus. There is no value in the use of pessaries at this time, and they should not be employed until the uterus has involuted properly and has been returned to its normal anteverted position. I have recently observed several cases in which retroversion pessaries have failed to retain the enlarged uterus. The possibility of these malpositions shows the necessity of making regular pelvic examinations at the end of the first and second month, otherwise the condition will be overlooked.

Perineal lacerations should also be observed at regular intervals. I have seen a perineum only partially healed at the end of the tenth day, yet the patient was discharged from the care of the hospital and physician. The process of repair varies with the general condition of the patient. In some it takes place quickly and a good result is present at the end of a week. In others a failure occurs because of the inherently poor character of the tissues or because of extensive trauma. In the former there is nothing to do except to reoperate at a later time. If infection has resulted or sloughing in the case of bruised tissues, operation must be postponed. Secondary perineorrhaphy at the end of ten days or two weeks is often followed by good results when the lochial discharges are fairly clean, but in the presence of a continuous foul lochia such intermediate operations had best be deferred and the wound allowed to heal by granulation. There is another class of perineal lacerations that must be noted, namely, those involving the sphincter ani and that have not been diagnosed immediately after delivery. Several cases have come to my notice in which after a week or ten days, with apparently normally functionating sphincter ani

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muscles, incontinence followed and examination showed that an attenuated sphincter was either torn or exposed in a perineal tear that had failed to heal. Such cases can usually be satisfactorily operated on at the end of two weeks. Episiotomy, either lateral or central, provides for better healing in many cases, and while I hesitate to recommend a routine operation, I think that it serves a good purpose in those cases in which a rigid outlet impedes extension and delivery of the head. Lateral episiotomy has the advantage of being somewhat further away from the course of the lochial discharges, but it is more difficult to repair and the resulting scar may be more painful than in the central variety.

The importance of unhealed cervical lacerations has been underestimated. The minor degrees undoubtedly heal without much disturbance, but in many cases the bilateral tears fail to unite and considerable eversion of the anterior and posterior lips results. This exposes the lining membrane of the cervical canal and so-called "erosions" of the cervix usually follow. Unhealed lacerations of the cervix offer an opportunity for the absorption of septic material that undoubtedly in a great many cases leads to milder grades of infection involving the cellular tissue in the lower portions of the broad ligaments on either side and also the area back of the uterus included in the region of the sacrouterine ligaments. The course of this infection is insidious, but is probably an important factor in producing the backache which so many women complain of during the first year after childbirth. A careful examination of postpartum cases within the first few months after delivery has demonstrated quite clearly to me that this is a complication to be reckoned with. It may be avoided to some degree by treating these so-called ulcerated areas as soon after delivery as possible by appropriate local measures. In a series of hospital cases which I examined recently every lacerated cervix case was exposed through a bivalve speculum and the raw surfaces swabbed with nitrate of silver or iodin. The patients were then directed to return to the hospital at least once or twice a week for further treatment. I have also followed this out in my

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private cases, and I think with good results, in so far as a limited number seem to have been free from further complicating symptoms. The immediate repair of cervical injuries might be referred to at this point. Some years ago at the Lying-in Hospital every primiparous cervix, which was lacerated, was immediately sutured; but we found a marked rise of temperature in so many cases that we discontinued the procedure and limited suture of the cervix to the advanced degrees when it was necessary to control hemorrhage. I do not believe, however, that in the majority of cases proper healing of the cervix results, as we find a great many instances in which the marked eversion of the lips already referred to shows that union has failed to take place.

The abnormalities noted include the commoner postpartum lesions to which others may be added, such as mild degrees of pelvic inflammatory processes, particularly of the tube; involvement of the urinary tract, urethritis, trigonitis, cystitis and pyelitis, which often are not disclosed until several weeks after labor; relaxation or inflammation of the pelvic joints, phlebitis of the pelvic veins, and finally, among the more unusual conditions, degenerative changes in fibroid uteri or torsion of pedunculated ovarian cysts. Any one of the above may escape notice or may not have been present at the usual time of the antepartum examination. In many instances the occurrence of such lesions may not have been preventable, but whether or no, timely recognition and treatment will at any rate reduce the invalidism which often follows in their wake.

In the hope of stimulating a more general interest in a follow-up system, particularly for institutional patients, the writer recently undertook the circulation of a questionnaire to obtain some information as to the actual methods which had been employed by various maternity hospitals. A copy of the questionnaire is appended.[1] A total of over 60 were sent out and replies were received from 48 institutions distributed over the country.

An analysis of the results shows that 36 out of 48 have some sort of a follow-up system for their obstetric patients, includ-

[1] See page 303.

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ing regularly organized clinical facilities in charge of the attending staff. In the majority (28) the patients only return if abnormalities develop, but they are not directed to report at stated intervals after delivery. In 31 institutions a social service system is maintained by nurses for following their cases and some provision is made for babies in 37 institutions. Provision for the treatment of gynecologic conditions noted after labor is made in 37 maternity hospitals, and in all they are referred elsewhere.

The admission is made by practically everyone who answered the questionnaire that a follow-up system for obstetric patients is not only desirable but necessary. In this connection the difficulties attending the institution of such a system for hospital patients must be acknowledged. A woman who is busy with the care of her family is not always able to come back for subsequent examinations unless the condition is serious enough to compel her attendance. This applies particularly to patients that live a considerable distance from the hospital, but should not apply to private patients who ought to be encouraged to visit their physician at least once a month for three months subsequent to delivery. If this is not feasible, arrangements might be made with a local physician. In the case of hospital patients the follow-up system is favored by the employment of visiting nurses, just as is now done by surgical, medical and gynecologic services. A number of institutions have already adopted this plan, and if the visiting nurse finds any gross abnormalities a hospital physician visits the case or the patient is directed to an institution. The organization of so-called "maternity center associations," as in New York City, may be of great value in the development of this scheme, especially as their clinics are ordinarily located nearer the patient's home than the hospital in which she was confined. Coöperation and coördination could, it seems to me, bring about working agreement in which the function of the "maternity center" could be increased in a most valuable manner and the hospital perhaps saved a certain amount of trouble and expense.

A regularly organized postpartum clinic should be part of

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every maternity hospital equipment. To this clinic every mother should be directed to come at stated intervals if possible. At such subsequent visits abnormalities which have developed since the discharge of the patient from the hospital can be detected and appropriate treatment instituted. Patients who present gross lesions, such as unhealed lacerations, uterine displacements, pelvic tumors and other conditions, could be kept under observation and treated surgically if the occasion demanded. It also seems desirable that gynecologic operations be done either in the same or related institutions, so that the patients remain under the observation of the same attending staff through the entire period. Such postpartum or we may call them gynecologic clinics should be under the direct supervision of attending surgeons, and, if possible, especially in the cases of operative deliveries the operator personally ought to make the follow-up observations.

Admitting the value and necessity of adequate observations on postpartum cases,what may be considered a practical scheme for developing this for institutional or private patients? The return of every recently delivered mother to a state of health at least approximating that before pregnancy, if not surpassing the same, should be the aim of every maternity service and also every physician who takes care of obstetrical cases. It is difficult to estimate how large a proportion of invalidism in women who have borne children can be traced directly to abnormalities of their pregnancy, labor or puerperium, but it cannot be denied that the proportion is a considerable one. The tendency of modern medicine has been toward prevention; can it be said that this effort has been sufficiently developed in the handling of woman's most important function in life? The results of childbearing cannot be expected to leave every woman in as good condition as she was previous to parturition, but an attempt should be made to diminish the proportion of invalidism as much as possible. I believe that this can only be done by concerted effort; by impressing, on the one hand, upon our institutions and physicians the necessity of keeping these women under a longer period of observation than has hitherto

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been the case, and, on the other hand, impressing upon the patients and their families the necessity and advisability for such supervision. A prolonged period of education may be necessary to accomplish this desirable end; but what has been accomplished in the domain of the contagious diseases, of cancer, of venereal disease and other conditions can likewise be duplicated in our obstetric practice. The survey of the situation which I have previously referred to shows that, in so far as maternity hospitals are concerned, great variation occurs as to the extent to which postpartum observations are carried out. It is unnecessary to refer to specific institutions, but it was found that in many instances patients were dismissed in from ten to foureen days after delivery without any definite instructions to return for subsequent observations. In other cases the social service workers or follow-up nurses visited the patients in their homes in conjunction with the work done with the babies. It is, of course, a difficult matter for large institutions to maintain a sufficient staff of follow-up nurses to see all their cases, especially those living at a distance from the hospital, and, as already stated, it is a difficult matter for many of these patients to make personal visits to the hospital for examinations, but it ought to be possible to overcome these difficulties in most instances. Recommendations cannot be made in a general paper of this kind that would be suitable for individual institutions, and this matter must be left to the indications demanded by each particular case. Hospitals and patients residing in their immediate vicinity ought not to have any difficulty in bringing them back for subsequent observation on stated days when a clinic in charge of a physician could provide for the necessary examinations. This is excellent training for the younger men who would learn by repeated observation on the same patient the course of involution after labor and other postpartum conditions. Many of the simpler lesions can be immediately corrected and those of a gross character kept under observation for possible future operation.

Such reformation of the accepted routine of obstetric hospital facilities as I have suggested will undoubtedly mean in most

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cases additional equipment and services that hospital managers may find it difficult to acquire under present conditions. But if it is the privilege and duty of our specialty to supervise the process of gestation from the time of conception through the delivery, this must also include the entire puerperal period and a revised conception of the length of the latter beyond the usual ten days must be made to prevail.

Hospital standardization is the cry of the hour, and in so far as this applies to obstetric institutions it must be made to take cognizance of the fact that responsibility toward the recently delivered woman does not cease with her discharge on the tenth or twelfth day, and the shortcomings of institutional work apply with equal force to private practice.

There is another phase in discussing the question of appropriate and longer postpartum care to which in conclusion attention may be directed. Sociologists have seen, perhaps before the medical profession, the advantage of proper and more prolonged care after childbirth and have sought to attain this end through the medium of compulsory maternity insurance developed under state auspices. There the working classes might benefit by a scheme whereby a period of recuperation after labor could be secured is a question that must be given serious consideration, and much as we may have in general revolted against all plans of compulsory state health insurance thus far proposed as too paternalistic, socialistic and un-American, some modification of such plan may prove a desirable means of lowering the morbidity and mortality of childbearing. The subject is one that the profession may well consider from the standpoint of constructive rather than destructive criticism.

During the last decade the development of standards for prenatal care have marked a great advance in our specialty in which we were led or goaded, stimulated perhaps by certain outside influences, but in conclusion I may venture a prophecy and hope that the next decade or two will witness an equal acceptance of the fact that more prolonged and studied observation of the postpartum period is a part of the responsibility which as conscientious physicians we owe to our patients.

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APPENDIX

An Inquiry into a Follow-up System for Obstetrical Patients

Does your institution maintain an organized system of observing mothers and babies after their discharge from the hospital? If so, please describe briefly the salient features of the system, particular attention being paid to the following points:

On what day after delivery is the puerperal patient discharged?

Is she directed to come back to the hospital at a stated time, or only if abnormalities develop?

Is there a definitely organized postpartum clinic provided on certain days to which patients may apply?

Under whose charge is the clinic,—attending surgeon or house staff?

Do attending surgeons see their cases at definite periods after discharge?

Are notes taken of such subsequent visits?

Have you any method of following up cases at their homes by social service workers or nurses?

Have you any information based on your cases of the proportion of postpartum women examined in whom the following conditions have been noted: Malpositions of the uterus, exudates, cervical erosions, lacerations, condition of perineum and results of perineorrhaphies.

In the event of lesions being found that demand operative or other treatment, what facilities are provided for their treatment in the same or other institutions?

Are such operations done by your attending staff, or are the cases referred elsewhere?

Do you consider the establishment of a postpartum clinic and follow-up system an essential duty of the hospital?

Are steps taken to insure proper supervision of the baby by visiting nurses or reference to pediatric clinics?

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DISCUSSION ON THE PAPERS OF DRS. MOCK, EDEN, ADAIR AND KOSMAK

DR. LEWIS J. POLLOCK, Chicago (by invitation).—I do not have the slightest conception as to why I should be honored by the request to discuss the questions which have been presented tonight, except perhaps, that neurologists and gynecologists have, for generations, mutually shared the responsibilities of some of the neuroses and psychoses. Not a long time ago the neurologist was instrumental in the collection of a great deal of pathological material highly cherished by the gynecologists of the past generation: I refer to the numerous ovaries which were removed for the supposed cure of some types of mental disorder.

Throughout the years there has been a constant effort to affiliate the gynecologist and the neurologist. Today this effort is reflected in such work as attempts to point out that the Abderhalden reaction shows a certain specificity to the sexual organs in dementia precox.

Hysteria has never been successfully divorced from its relation to the uterus. At first it was associated with the physical disfunction of this organ, but with the advance in civilization we find it in close affinity with the "libido."

The experiences in the recent war demonstrated conclusively some of the mechanisms entering into the formation of the neuroses, much, I think, to the disappointment of many men who uphold the theories of Freud which, you remember, are based upon the hypothesis that hysteria and most of the neuroses are the result of repressions of unfulfilled desires which are related, in a broad sense, to the sexual sphere. Unfortunately for their hypothesis, the cases of so-called "shell-shock" were concerned with an illicit motive related to the instinct of self-preservation. Whether dealing with civil or with war neuroses, it is found that they occur in the presence of the conflict between the desires of an individual and his conceptions which have been built up by breeding, education, religion and social law. In the war neuroses occurred as the result of the inability of the soldier to adapt his wish to escape from danger and discomfort to his patriotism and his ideals; as a result there arose the defensive mechanism of a hysteria. Of course this process was an uncon-

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scious one. In civil neuroses the conflicts concern themselves not only with the instinct of self-preservation, but with the adaptation of an individual to social life. It is natural that many of these conflicts are related to the instinct of propagation of species and, therefore, sex.

Our ability to react adequately to the demands of society depends largely upon our education, and as a result, from a prophylactic standpoint, it is of the greatest importance that everyone be taught such things as particularly enter into the greatest conflict of life. The polish of civilization and the mask of society has not changed our status as animals. It is necessary to learn how to avoid the pitfalls encountered in the adaptation of our animal wishes to social mandates.

One of the great factors in the formation of neuroses is fear. Frequently this fear is related to masturbation. One thing has always forcibly impressed me; we are inclined to seek for this fear only among the male sex, although the same habit and the same fear occurs frequently in women. In so far as sexual education is concerned the greatest efforts have been directed toward men. Fear reactions based upon incidents frequently occurring in childhood are often observed in the neuroses. In women these fears may be based on some unpleasant, disgusting, or frightful sexual experience, or some normal condition in the appearance of which they had not been instructed, for example, menstruation.

In so much as the treatment of the disease is its prevention, it appeals to me strongly that we should make a definite effort to instruct all children during the period of the development of secondary sexual characteristics, in the physiology of sex, the normality of certain functions, the harmlessness of certain habits which will undoubtedly be exhibited by many children, and attempts to adapt them to a life in which the fulfillment of one's desires must be curtailed by social law.

Dr. Emil Ries, Chicago (by invitation).—The relation of gynecology and industrical medicine will impress the gynecologist a great deal more in the near future than it has done before. Industrial Medicine, Big Business, and Insurance will enter into our American medical life in a comparatively short time to such an extent that it behooves us to consider what is going to happen.

Dr. Mock, an apostle of industrial medicine in the United

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States, has mentioned already that under the present conditions a great many inferior men, men with insufficient education, men with insufficient experience, have gone into industrial medicine which seems to open up an easy way for them to make a sure livelihood. From such men we cannot expect any good from the standpoint of the development of industrial medicine. The consequence will be that questions of industrial medicine, as far as they concern the gynecologist, will soon be brought up to the Appellate Court of the Specialist, to determine the questions that have been raised by the industrial doctor.

There are not very many doubtful points in gynecology which are liable to appear in connection with insurance work. The congenital malformation can be ruled out. Obstetrical injuries have nothing to do with machinery. Tumors are more uncertain. But the worst trouble we are going to have is with those conditions about which we ourselves are divided, the normal and abnormal positions of the uterus.

I heard Dr. Mock mention tonight as pathologic cases, one a sharp anteflexion, and 3 cases of retroversion. I am sure, there are quite a few gynecologists who do not consider a sharp anteflexion a disease nor a retroversion. This question will come up in thousands of cases as soon as women who have had any injury in the course of industrial work come with histories of headaches and backaches, which they explain on the basis of a malposition. The majority of general practitioners cannot make a diagnosis of retroversion or the position of the uterus in general. The average general practitioner cannot diagnose the position of the uterus at all, and when he does not feel the uterus he calls the position retroversion or retroflexion. Now the following is going to happen in hundreds of cases of industrial accidents: A woman in industrial work will come to the gynecologist and he finds a retroversion of the uterus. The first question is, did this retroversion exist before the accident? Second, whether it did or not, has it anything to do with the woman's symptoms? I can see twelve good men and true sit on the question and the Supreme Court will ultimately have to decide whether retroversion is a disease or not.

Dr. Mock opened up a wonderful vista of possibilities for gynecology. I have always regretted that women did not generally join the Army and have an examination before they were admitted. If they received such an examination, we would

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know more definitely how many women carry the uterus backward and how many carry it forward. The percentages of the habitual positions of the uterus could be easily determined in that way, and Dr. Mock mentioned that certain industrial plants had started a system by which they insisted on a pelvic examination of their employees. That would be a wonderful and magnificent thing for us, and it would be the finest insurance for these industrial plants.

Naturally the women could not claim that their retroversion was due to an accident if they were known to have had it before they began work in the factory. The scientific gain would even be more enormous than the saving in dollars and cents for the insurance company. I forsee further that many of the functional disorders of the female, such as amenorrhea, dysmenorrhea, symptoms which are generally ascribed to gynecologic organic lesions, and so seldom have anything to do with them, will be brought to the front. For instance, a backache will from that time on become more important to the gynecologist and attract his attention to a much more definite degree than it ever did before. When a woman files a claim for ten thousand dollars against the factory in which she is employed because she has a backache, we cannot disclaim the backache. Nothing is harder to disprove than an ache, and that is where our gynecologic wisdom will be sorely tried. I foresee we will have the same horrible spectacle that our good friends the neurologists have given the world in medico-legal cases. We may find five experts who will testify one one side that such and such is the case, and five for the other side if paid for it.

I think industrial physicians and surgeons should use every effort to induce factories to insist on pelvic examination before employing women. Infections which are of a chronic nature and leave women with a more or less pronounced leukorrhea are very liable to be attributed by those women to their position in working or to the pushing of a piece of machinery against their body, etc. A jury is liable to be impressed with such statements. I was present in a case where a woman claimed that in consequence of stepping off a street car before the car had stopped completely, she had acquired carcinoma of the uterus, and the jury gave her six thousand dollars.

Industrial medicine will do gynecology an enormous service if it will coöperate with the gynecologist in settling these impor-

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tant scientific points. Here is a wonderful chance, a chance the world never has seen before for gathering information about conditions of the female sexual tract which until now, for lack of large statistics, are still *sub judice*.

PRESIDENT DICKINSON.—When there is a school of hygiene in every city, and when there is an industrial clinic in every group of industrial workers, 75 per cent. of the population in the urban and circumurban regions will be in the hands of these preventories. In other words, the greater part of the preventive work of the world two hundred years from now will be in the hands of the man who has written the first text-book about it and his colleagues. Industrial medicine is going to be a great development in the future of medicine, and it is time for us to get into it early and do our share of it.

I would like to introduce one speaker who taught me part of this work in the war in connection with the Shipping Board. He made a great record in this department and it gives me very great pleasure to introduce to you Colonel Philip S. Doane, now plain Dr. Doane, of Chicago.

DR. PHILIP S. DOANE, Chicago (by invitation).—Dr. Mock has spoken to you of industrial medicine largely from the standpoint of a surgeon. Most of the men in charge of industrial workers are surgeons; they know very little about gynecology. Being patriotic, I went into the war game and tried to do my part as a soldier. Instead of getting hold of surgical work, they assigned me to the Shipping Board, and I had charge of the health and sanitation of the shipyards. I was interested in gynecology and have been throughout my medical career, and I was much interested in the problems of female employees all over the country.

In Washington and Philadelphia we had over 1000 women and girls who came to us from all parts of the country. They came for patriotic reasons; they also came for pocketbook reasons. These females were young, married, ex-married and old. I tried to make a study of the gynecologic conditions among these thousands of women and girls, and I divided them into various groups. (1) The girls; (2) the adult females; (3) the ex-married women; (4) the married women, and the wives of the male employees.

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A few notations possibly will be of interest to you. The girls I found indifferent to any gynecological conditions, usually because of ignorance. They were difficult to instruct because of lack of interest. They were afraid to report disease. I found that this class was most susceptible to seduction. I found that the lower or laboring class among these girls showed the most marked conditions which I attributed to lack of knowledge or to ignorance.

We established very shortly a dispensary staff, and I called from the west nurses whom I had in my personal service for over five years to assist me in this particular work. We added to our staff, and from these intelligent nurses I was able to obtain quite a number of points of interest. I found it was necessary to follow Dr. Mock's ideas as he has given them to you and to carry out instructions with these girls in the care of themselves, their hygienic surroundings, dress, particularly food, which was difficult to obtain in Washington and Philadelphia during the war period, that is, food that was of the proper kind. We instructed them in habits and cleanliness, and so forth. We also corrected the hours of work for these girls. I had the coöperation of my superiors who were heartily in accord with any measure that would add to the efficiency of these girls, and they helped in every way possible. We saw to it that they had proper light; that they had good, fresh air, proper drinking water, and good, nutritious food.

Fortunately I was able to add to my staff some of the best sanitary engineers that America produced during the war, some of them professors in colleges, so that we were able to carry on these measures scientifically.

We found the girls ate scantily at lunch time. A small piece of chocolate or something of that kind often sufficed. We looked into the toilet facilities which in many shipyards, in the offices and so on, were very inadequate. The rest rooms we found to be of the very greatest importance. They were made clean, attractive, light, and fresh. We placed a competent trained nurse, as far as obtainable, in the various shipyards and offices, and in many instances we were able to obtain qualified women physicians. We found that the girls would not report to the male physicians and industrial surgeons. They would report in many instances through the same nurse or competent female physician. We established clubs, exercises, and so on.

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The adult females we found wiser than the girls as a general rule and they were open to instruction. We found the great majority of them had suffered from some sad past experience. They would readily consult a female doctor or a nurse. They appreciated every health and sanitary measure we established. We found the majority of ex-married women suffering from some female complaint, and particularly did we find this so among the laboring classes. We found, however, that it was difficult to obtain knowledge of their trouble because of their fear of being discharged. They would not report their trouble before employment. They might possibly report it after employment if promised a continuance of their job. They did not desire a record made of their disabilities. We found it advisable to keep a separate record of these cases, and the record was made after the patient had left the dispensary. The record was not kept with the knowledge of the patient. We found that these ex-married women suffered from diseases usually of a postinfectious type, but in some instances the diseases were secondary to delivery by midwives. The married women in our employ were mostly young married women, or recently married women. They were most willing to seek instruction and to be guided. They were not generally infected or diseased. They usually discontinued work on becoming pregnant. They profited by the previous instruction given them by the nurses or doctors. If the husband was an employee, his wife came under the care of the medical staff at the time of delivery. They were taught to avoid midwives.

With reference to the male employees, they did not ordinarily come under the care of the institution employing males. I am touching upon a subject which is rather in dispute, but during the war I found it most advisable to look after this service. It was of the very greatest importance that we have the full and efficient time of every male employee to build ships. We had to have it regardless of cost or any form of excuse. I secured from my superior consent to look after the service of male employees. We profited by it tremendously. During the flu epidemic I found that 40 per cent. of the absentees among male employees were at home caring for the sick members of their families. I established hospitals in the various cities where we had yards, and took these sick members into the hospitals. The shipbuilder was returned to the yards and we secured his

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full time. He worked better than he had ever worked before. The sick wife of a male employee means that the employee, if he worries, is indifferent, suffering from lack of sleep, is discouraged, discontented, disgruntled, is an inefficient worker.

What is the cure for this condition which confronts the gynecologist today? I feel that in every medical college there must be a chair of industrial medicine established. Dr. Mock already occupies such a chair. We cannot commend too highly the efficient work he has done for this country. Dr. Mock has a very great responsibility upon his shoulders. He must make preventive gynecology an important feature of instruction. The industrial surgeon must interest himself in this subject. I find female employees generally are ignorant in preventive gynecological measures. I find the average trained nurse is more or less ignorant, and I find the industrial surgeon does not know anything, generally speaking, of gynecology. This must be changed. The gynecologist in himself is absolutely too narrow; he is too much interested in operative work, too indifferent about a subject of this kind, and it is time that he should awaken to it.

Dr. Joseph B. De Lee, Chicago.—As the hour is late, I shall make but few remarks on preventive obstetrics, particularly from a sociological point of view, and the value of women having babies to society. The value of a woman having a baby to society is 100 per cent., and the safeguarding of the woman to society depends upon the obstetrician. Why do we not have more obstetricians? Why do we have so many surgeons and so many men representing the other branches of medicine? The answer is very simple, too simple. The life of the obstetrician is not a happy one; the work is very hard, and the remuneration is very little. The sociological aspect then will require careful and economic studies of the women having babies, and it is more than possible that when industrial insurance and compulsory health insurance come the obstetrician will have to be one of the first to be consulted. It costs money nowadays for a woman to have a baby. The amount of time which prenatal work requires is not small. The number of visits, the number of urinalyses, the number of investigations of the woman's condition are large in the course of seven months' antenatal care. The time spent in caring for the woman at labor is not minutes,

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but hours, sometimes days. Postnatal care also requires time, and now comes Dr. Kosmak's follow-up system which will take another six months. If a few women can afford to pay for all this attention over a period of fourteen months, well and good, but there are very many others who cannot afford to pay fees commensurate with the work; therefore, somebody must put up more money to give the poor women good obstetric care. Midwives cause a large percentage of the trouble, but the main reason for the trouble in women having babies lies in the function itself. Labor itself causes trouble. It is not possible for a large baby to pass from the uterus without causing material damage. How can we prevent this damage? We have to educate our doctors, but we cannot expect ideal results with obstetrics as low in public esteem as it is. People will not pay for obstetrics with the present standards. As long as the state allows midwives to practice obstetrics, people who have money to pay for it will not consider a confinement requires an expert, and so we have yet the task of raising the ideals of obstetric practice. If you will regard obstetrics as of pathologic dignity, you will immediately raise the ideal, for anything that is pathologic requires proper investigation and study and expert attention.

Dr. Eden reminded us of the high mortality of babies in normal delivery. It is a great confession on his part that a normal delivery can cause the death of the baby. I would say this is pathologic. Dr. Kosmak told us of the difficulties and the dangers of injuries to the pelvic connective tissue and cervix; that they have much to do in the causation of chronic inflammatory conditions in the pelvis. The prevention of these things requires a high degree of obstetric skill, much higher than is generally known, and the only way to get the public to appreciate that is to let them know that we doctors consider a normal obstetric case of the highest pathologic dignity.

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A NEGLECTED FORM OF CERVICAL ENDOMETRITIS

By Henry T. Byford, M.D.
Chicago, Ill.

The diagnosis and treatment of chronic endometritis, as it affects the middle and lower portions of the cervix, have been well described in our literature. But the same can hardly be said of inflammation at or contiguous to the internal os. Dilatation, eversion, erosion and cystic degeneration do not take place at the upper the same as at the lower end of the cervix. The internal os dilates only slightly, its lumen is crowded with swollen and obstructed glands and the circulation is interfered with at first by the pressure from within, and later from without, by a contracting band of inflammatory exudate. On account of such interference, resolution does not take place to the same extent as below and a ring of imperfectly organized connective tissue remains whose upper edge is at or just above the os and whose lower edge merges into the somewhat thickened mucous membrane below it. In multiparæ this band or constriction ring does not necessarily interfere with uterine drainage, but in nulliparæ it usually takes on some of the characteristics of stenosis.

The presence of this constriction ring is ordinarily overlooked by the practitioner who thinks in terms of tampons, and sometimes by the gynecologist whose scientific lenses are focussed for operations. The reason is that neither one is looking for it, and do not avail themselves of an intelligent use of the uterine sound. When the sound passes through the ring

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without resistance the condition is not suspected; when it encounters resistance the difficulty is attributed to faulty development or anteflexion and the dilatation intended for the relief of the supposed defect sometimes relieves most of the symptoms for a short time and the patient is pronounced cured of what she did not have. But the symptoms either return in a short time or the original condition persists in a slightly ameliorated form.

The diagnosis, made by means of the sound, is confirmed by the results of the treatment, namely, by the disappearance of the physical signs and the relief of subjective symptoms, such as backache, headache, reflex stomach disturbances, malaise, dysmenorrhea, menorrhagia, intermenstrual pain and sterility. The number and severity of the symptoms vary greatly in different cases, depending in part upon the interference with the lumen, the chronicity and the associated pelvic conditions, and partly upon the patient's general resisting powers and nervous habits. Some patients do not complain of many symptoms, yet I think that chronic inflammation in this location produces more subjective symptoms than in any other part of the uterus. Its symptoms are often attributed to a corporeal endometritis when such does not exist.

In all cases of chronic cervical endometritis or supposed corporeal endometritis we should search for induration about the internal os. The first and most noticeable sign in all but the most chronic cases is pain produced by a slight pressure of the sound. When the os is anatomically small or is flattened by flexion the pressure is not painful until it causes some dilatation or straightening, or at least until firm pressure is made. When the sound is passed through an inflammatory constriction, with slight pressure, its withdrawal is followed by a show of blood at the external os or by a stain of blood on the sound. In stenosis or underdevelopment, not due to or connected with inflammation, it requires not only firm pressure but some forcible dilatation to produce a show of blood. That the tenderness is primarily at the internal os, and not due to a general intrauterine tenderness, is known by the cessation of the pain

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almost as soon as the bulbous end of the sound has passed the internal os, even though the sound be manipulated so as to impinge gently against the uterine walls above. When the constriction ring is so large that it does not interfere with the passage of the sound a little gentle manipulation can be made to locate the tender area at the internal os. The constriction ring seldom produces an abrupt and decided projection on the surface and the sound may feel as if it slipped over the edge of the thickened mucous membrane into the somewhat more spacious uterine cavity above. When the ordinary uterine sound thus passes without encountering resistance a series of graded sounds that taper slightly at the end are required both for diagnosis and treatment. In passing such a sound large enough to dilate slightly we produce the diagnostic pain and show of blood already mentioned. In very chronic cases moderate pressure may not produce the show of blood, but in its place a lump of inspissated mucus, expressed from the glands, may be found adherent to the sound.

The ring of exudate can in some cases be traced by the uterine sound around the entire circumference; in others a part of the circumference will have no ridge but be flat, smooth and of a cicatricial hardness, indicating partial or complete local destruction of the mucosa. I have recently had a case of bilateral deep laceration of the cervix in which by separating the labia I could see the smooth, red, cicatricial flat surface posteriorly and the elevated ridge anteriorly. Both had been already recognized by means of the sound. The lateral lacerations were quite deep, and I suppose that the flat cicatricial surface represented the site of one or more superficial lacerations at the internal os which had not united.

In two of my cases the slight dilatation produced by the passage of the uterine sound caused the patients to faint when they got off the examining table. In several cases the patients have turned pale and dizzy and have had to lie down or take a drink of ice water or go to an open window to avoid syncope. This would probably have occurred oftener but for the fact that many of them remained on the examining table long

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enough for the effect of the local irritation produced by the examination to wear off. This symptom I believe is produced more often in cases with old well-organized exudates. I have known painful dilatation of a small, comparatively healthy cervix to cause nausea and a feeling of faintness, but it came on during dilatation and passed off quickly and never caused the patient to feel like fainting after she stood up.

The treatment calls, first of all, for dilatation. Stimulating applications before any dilatation has been effected are not always borne well and sometimes aggravate the condition. My experience has led me to prefer gradual progressive dilatation to extreme divulsion at one sitting. The latter is liable to produce one or more lacerations that extend through the constriction ring so that further dilatation separates the lacerated edges of the ring without having much effect upon the exudate. Subsequent contraction takes place, requiring one or more subsequent divulsions, unless it is kept from contracting by the periodic passage of sounds the same as for progressive dilatation. The repeated mild stimulation of progressive dilatation with graded round dilators not only causes a steady improvement, but it more often cures the sterility which is the result of the presence of the inflammatory exudate rather than of mechanical obstruction.

When the patient cannot or will not stand the pain of progressive dilatation I make the first one or two under the influence of nitrous oxide gas. However, I do not carry these dilatations far enough to cause lacerations and depend as much as possible upon the subsequent periodic use of the round dilators. A very slight increase in the amount of dilatation at each sitting is all that is necessary. I dilate twice a week in such cases; once a week in those who can endure more at a time.

Before dilating I swab out the vaginal vaults and cervix thoroughly with a 5 per cent. solution of phenol; afterward I apply a 20 per cent. solution of phenol in glycerin to the entire uterine cavity. When a round dilator equal in size to a No. 25 urethral dilator, French scale, can be passed without causing a show of blood or producing much pain, I apply a stimu-

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lating solution of iodized phenol to the entire cervical cavity and dilate twice a month for a few times, and then once a month until I am satisfied that the parts are in a fairly healthy condition. In cases with a large lumen I use the same treatment, except that I begin and end with larger dilators.

I think that the occasional failure of an Emmet or Schroeder trachelorrhaphy to relieve symptoms is often due to the presence of this constriction ring about the internal os. The dilatation which is often done as a preliminary step for the purpose of uterine treatment or disinfection may afford temporary relief, but some of the symptoms usually return and may make the trachelorrhaphy seem a failure to the patient. In the first few cases of returning symptoms after trachelorrhaphy that came to my notice I supposed that the external os had been closed up too tight. But the external os must usually be very small and unusually rigid before it will give rise to subjective symptoms of any importance.

I am inclined to believe that the infections due to the use of dilating tents have usually been partly due to laceration of this constriction ring. I also believe that there is great danger of starting an infection by office dilatations unless facilities for disinfection and an aseptic technic are available, and are faithfully carried out; the more so if the abrasions or minute lacerations of the mucosa are not given time for repair between treatments. When the dilatations produce a considerable show of blood I usually wait a week for the abrasions or superficial lacerations to heal, although they can safely be made every three or four days if dilatations are slight and a perfect antiseptic and aseptic technic is carried out.

DISCUSSION

Dr. Arthur H. Curtis, Chicago.—I believe Dr. Byford wishes to especially emphasize the inflammatory constrictions near the internal os. My experience during the last fifteen or eighteen months has revealed a surprising number of strictures

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and granulations of the cervix. There is no question that these are an important factor in the production and persistence of a chronic discharge. However, irrespective of how careful one is in performing these dilatations, if one removes the normal constriction which nature has placed at the internal os, there is likelihood of causing infection, not only of the uterus, but the Fallopian tubes.

I hope those of you who do follow out Dr. Byford's suggestions to do away with granulations and strictures will not dilate too frequently.

Dr. Herman J. Boldt, New York City.—Probably in recent years more attention has been paid to surgical gynecology than to minor gynecology, as we find it in office work.

The condition which Dr. Byford has spoken of has not been considered by me to be of an inflammatory character; but we must remember a mild degree of constriction we often find about the os internum, and in the majority of cases we have dysmenorrhea associated with it. As I remarked before, surgical intervention has played such a prominent part that the minor part has been lost sight of. That condition I believe can be best combated with a remedy that was thrown into the waste paper basket long ago, namely, the intra-uterine use of the galvanic current. You pass a sound on the same principle that it is used by the genito-urinary man for strictures of the urethra without forcible dilatation. With the use of an electrode, so that it will pass and keep up a current of two milliampères, with the negative pole in the cervical canal, continuing the current for ten minutes, that particular class of cases can be relieved by that method of treatment. The 10 per cent. phenol that Dr. Byford uses is usually a sufficient antiseptic. From my point of view, this peculiar condition can be better relieved by the method I have mentioned than by any other surgical intervention.

Dr. Robert L. Dickinson, Brooklyn, New York.—The old question of whether this constriction at the internal os is pathologic or not, hinges very often, as far as the symptomatology is concerned, on whether metritis is or is not present. There may be a tiny opening with no symptoms whatever as we know, but if the narrowing is connected with either a persistent or recurrent spasm, or a considerable localized metritis, we then have an aggravated form of dysmenorrhea.

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What are the specific tests by which this condition can be determined? We have learned by surgery that some anteflexions and some of the worst cases of spasm of the internal os under complete relaxation, under complete anesthesia, disappear entirely.

There is no evidence of what we thought we were going to find when we get the patient on the operating table. A case of dysmenorrhea in which we expected to find a very marked anteflexion and very marked narrowing at the internal os is under the anesthetic found to be a pure spasm. Sometimes I think the only way to make a diagnosis is by the use of an anesthetic. However that may be, a neglected procedure is to determine by the sound whether there is an area of excessive sensitiveness at the internal os which, when touched with the tip of the sound, produces a typical dysmenorrheic pain for which the woman comes to you. We have then two tests.

A third test is this: Suppose you take a Goodell or graduated dilator and dilate such a tender, narrow internal os, and the patient is free from dysmenorrhea for a while, for a month or two or three months, and then it returns, you not having treated her in the meantime; again you do a dilatation, and again she is relieved of pain, and she comes back at stated intervals asking for that relief, I take it, that is as good proof as we ever can get in the application of our scientific art. In other words, there are three tests of the question of an inflammatory or spasmodic or contracted internal os, or one around which there is an area of marked metritis—the test of complete relaxation under anesthesia; the test of extreme sensitiveness producing dysmenorrheic pain, and the test of a very mild office dilatation, carried on under antiseptic precautions, completely relieves the symptoms. I believe a large proportion of these cases that are persistent have a localized metritis around the internal os.

Dr. Thomas Watts Eden, London, England (by invitation). —I should like to ask Dr. Byford whether he has any pathologic evidence bearing on this condition, whether he has had an opportunity to examine uteri showing this zone of cervical contraction. One must feel a little hesitation in concluding that we have got a definite pathologic condition until we have been able to confirm it by direct pathologic observation.

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Dr. Henry T. Byford, Chicago (closing the discussion).—I have not taken out the uterus for this condition, and therefore cannot demonstrate its pathologic nature. The exudate in the cervical endometrium is merely a little thicker at the internal os where reparative processes are interfered with by a small lumen or by small lacerations and cicatrization. This extra thickness of the mucosa at the internal os would probably not attract attention in a specimen unless suspected.

Dr. Curtis warns us against too much dilatation. I have advised in my paper against wide dilatation. When I put patients under an anesthetic I do not dilate widely for fear of producing small lacerations. If no laceration of tissue has been produced, there is no danger of making the internal os permanently too large. It always contracts. I have these patients come once a month for two or three months to see it does not contract too much. Except in those cases of multiparæ in which we have a large os due to lacerations during labor, I have not had any injury that kept the internal os patulous.

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HEMORRHAGES INTO THE PELVIC CAVITY OTHER THAN THOSE OF ECTOPIC PREGNANCY

By Richard R. Smith, M.D.
Grand Rapids, Mich.

That ectopic pregnancy is by all odds the most frequent cause of hemorrhage into the pelvic cavity is a long-established fact. That there may be, however, other causes for such hemorrhage is something that every surgeon of wide experience knows. A considerable literature testifies to the same truth. An experience with a case of hemorrhage from a rupturned Graafian follicle, and several instances in which blood was found in the pelvic cavity, have led me to seek further enlightenment from the literature. It is the result of this investigation that I shall attempt to sum up for you. First, however, I wish to cite the case referred to above.

A. L., single, aged twenty-four years, gave the following history: As an infant she had rickets and did not walk until she was three and a half years old. From that time on she was robust until four years ago, at which time she had some acute illness of uncertain nature, lasting a week, and in which she lost many pounds in weight. She has been below par physically since that time. During the past two years she has had occasional attacks of vomiting (usually one or two hours after eating), lasting altogether from one to three weeks. Shortly after the illness mentioned above she had an attack of pain and soreness in the right side, which lasted about a week. Two years later she had a similar attack.

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The present attack began six hours before operation, with acute severe abdominal pain, which radiated through to the rectum. This pain was so severe that she was "all doubled up," as she expressed it, and perspired freely. The acute attack lasted about an hour and then gradually eased off. She was seen about two hours after the onset. There was some tenderness over the lower abdomen, with the principal point low down on the right side. There was no distinct rigidity, but the cutaneous reflex was absent in the right lower quadrant. By rectal examination there was great tenderness in the right cul-de-sac. Pulse and temperature were not disturbed. With the history of previous attacks and the present history and findings a diagnosis of acute appendicitis was made and operation advised.

On opening the abdomen through an appendicular incision a small amount of sanguineous fluid escaped. The appendix, which we had supposed was directed down into the pelvis, lay to the outer side of the cecum, extending well up toward the kidney. It was kinked and bound down by adhesions, but there was no sign of recent trouble. It was freed and removed. Further examination revealed blood coming from the pelvis. Since a more thorough examination was necessary a median incision was made and the pelvis examined. The uterus was normal in size and position. Both tubes and the left ovary were normal. The right ovary was as large as a walnut and presented a ruptured Graafian follicle the size of a hickory-nut, which had evidently been the source of the bleeding. There were about two or three ounces of fresh blood. The follicle was dissected from the ovary and the edges united. The patient made a good recovery.

Dr. Warthin (pathologist) of Ann Arbor reports: "Shows only a normal hemorrhagic follicle, with early development of the corpus luteum, nothing pathologic. We have had similar cases thought to be ectopic and showing nothing more."

Dr. Warthin, in further correspondence, says that since 1895 he has had five similar cases in the diagnostic service of the pathological laboratory of the University of Michigan.

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Complete histories of the cases were not then available, but in all the condition has been thought to be ectopic gestation. Two of these cases, who were unmarried, had exposed themselves to the danger of conception; in the other cases there was also a fear of pregnancy. The patients were all young women, one or two periods had been missed, there were nervous excitement and worry and then symptoms suggesting ectopic pregnancy. Large, apparently normal hemorrhagic follicles were found, with amounts of blood varying from several teaspoonfuls to several tablespoonfuls in the cavity. Histologic examination showed no evidences of pregnancy. Dr. Warthin's experience with the condition is interesting as showing the relative rareness of the condition and the suggestion that mental excitement and worry may sometimes have some relation to it.

The number of such cases found in the literature is a considerable one. Cases very similar to mine are reported by Adams,[1] Bartelo,[3] Bender and Marcel,[5] Benthin,[6] Bertkau,[7] Bonneau,[11] Bookman,[10] Bovée,[8] Cranwell,[13] Edgard,[15] Engstrom,[16] Forssner,[18] Hind,[21] Kober,[23] Ladinski,[25] Lee,[26] Lockyear,[29] Luken,[30] Novak,[34] Ohman,[36] Pfeilsticker,[37] Primrose,[39] Roll,[40] Romme,[41] Simonds,[44] Tartansen,[45] Taylor,[46] and Winiwarter.[52]

Dr. F. C. Warnshuis has kindly furnished me with the report of a case of this kind coming under his observation.

M. K., school-girl, aged fourteen years, had had the usual diseases of childhood, but no serious illnesses. Menstruation, beginning at the age of twelve, had been regular, occurring every twenty-eight to thirty days, and had been in every way normal. She was a well-developed girl and had the appearance of seventeen years. Her present illness began November 27, 1913. While at school she stated that she had cramps in the abdomen. She came home complaining of abdominal pain and nausea. After reaching home she vomited. Her symptoms increased, and Dr. Warnshuis saw her about nine-thirty that night in consultation.

The abdomen was everywhere tender, but extremely so in the right lower quadrant, and there was slight distention. By

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the rectum a great deal of pain was elicited by pressure in the right cul-de-sac, and there was a certain amount of bogginess there. There was a very slight bloody discharge. Temperature, 98°; pulse, 110. A clinical diagnosis of acute appendicitis was made, but because of having had a somewhat similar case two weeks before (see bibliography) a ruptured Graafian follicle was thought of. Operation was advised and carried out that night.

Right Rectus Incision. On opening the peritoneum blood was discovered in considerable quantities. The right tube and ovary were brought up; the latter was ruptured and an active hemorrhage was taking place. The ovary was removed. The appendix was normal. Abdomen cleansed of blood and closed. Pulse at close of operation 136, but condition was otherwise good. She made an uneventful recovery. Pathologic diagnosis of ruptured follicle; no decidual or placental tissue.

The histories of these cases read very much alike. They have occurred usually (though not always) in young women, just before, during or just after menstruation. The diagnosis has either been acute appendicitis or ruptured ectopic pregnancy, and the real condition has not been learned until the abdomen was opened. A ruptured Graafian follicle has been found as the only source of hemorrhage. The loss of blood has varied considerably; in a few instances it has been large enough to cause very serious symptoms. The pathologic report has shown no change in the bloodvessels, nor anything to distinguish the ovary or follicle from the normal. It is not difficult to conceive that if one had this possibility in mind a more or less positive diagnosis might be made before operation. Such an attack occurring about the time of a menstrual period in an unmarried woman might lead one to at least suspect that the case was one of ruptured Graafian follicle. If the symptoms were mild one might even defer operation under careful watching. However, at the present time operation would seem to be the safer plan, both because of the uncertainties of diagnosis and the possibilities of continued hemorrhage. I

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think these cases of acute hemorrhage from a ruptured Graafian follicle or corpus luteum should be grouped by themselves, because they are apparently not caused by any pathologic condition of the ovary or pelvic organs and because they are emergencies which call for immediate clinical attention and usually operation.

Two variations from the usual severe Graafian follicle bleeding should be mentioned. One occurs in hemophilic subjects. An interesting case of this kind has been published by Warnshuis.[49] The patient was a girl, aged seventeen years, who gave a history of having had an attack of appendicitis one year previously. At this time she had apparently been very ill. Menstruation had been regular but attended with some pain and clots. The family history was negative as regards hemophilia. On January 12, 1912, while attending school, she was seized with severe pain in the abdomen and some nausea, but no faintness or dizziness.

When seen later there was general abdominal tenderness, but more marked in the right lower quadrant, and there was muscular rigidity. This with the history of pain and nausea made acute appendicitis a probable diagnosis and she was accordingly operated at once. At the time of her operation her pulse was 84 and temperature 99.4°.

Upon opening the peritoneum there was a gush of fresh red blood and clot. The right tube and ovary were normal; the left ovary was ruptured and was removed. An appendix (surrounded by adhesions) which had evidently been the seat of a former appendicitis was removed. Pulse at the close of operation was 140.

Pathologic Report: "Ovary was normal in size. There is a ruptured follicle. There were multiple hematomas but no decidual cells."

On the third day the patient had a severe nasal hemorrhage controlled by packing the nostrils. The morning of the eighth day the nurse reported that her dressings were soaked with blood. Investigation showed that the blood had come from the lower end of the abdominal wound. The hemorrhage con-

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tinued and she was taken to the operating room. The wound was reopened under local anesthesia down to the peritoneum. There was marked capillary oozing and a small artery was bleeding in the right rectus. This was tied. Patient died that night.

Another variation worthy of note is a case of hemorrhage which occurred from a corpus luteum after operation. The case is reported by Ferguson.[17] The patient was aged thirty-seven years, and suffered from a fibroid. He did a supravaginal hysterectomy, the operation being a simple one. Both ovaries and tubes were left behind, as they were quite healthy. At the time of the operation a large corpus luteum was noticed on the surface of the right ovary and attention was called to it merely as a point of interest. The operation occurred in the morning at nine-thirty, the patient leaving the table in good condition. At five that afternoon the nurse noticed that the patient looked rather pale. At eight-thirty that evening the pulse had risen to 130, was very weak, and there were marked signs of hemorrhage.

The wound was reopened under anesthesia and a large quantity of clotted and fluid blood was found in the abdominal cavity. After clearing the field Dr. Ferguson made an examination of the pelvis and found that the hemorrhage had occurred from the corpus luteum seen at operation. The appendage was removed and the patient recovered. The case is of unusual interest, showing the possibilities of hemorrhage from this source after hysterectomy, with retention of the ovaries, the operation as it is commonly performed today. One might hesitate in light of his experience to leave uncared for an ovary with a large corpus luteum in it.

Excluding now tubal pregnancy there can be no question but that the ovaries more frequently give rise to intraperitoneal bleeding than any other of the pelvic organs or structures. There are apparently good reasons for this. They have little firmness, their blood supply is large and in a constant state of morphologic and functional change from puberty to menopause. There is menstruation each month and ovula-

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tion with extrusion of the ovum. At this time the follicle fills with blood. At menstrual times the pelvic organs are congested and to a lesser degree during coitus. Displacements of the organ or large tumors in the pelvis are liable to cause blocking of the return circulation, and thus hemorrhage from the ovaries is favored.

These explanations are not altogether satisfactory when applied to each individual case. The real cause of the hemorrhage in most instances remains unexplained. It is quite as obscure as much of the pathology of the organ in general. We are in doubt as to the cause and we are often equally so in regard to the exact origin of the hemorrhage and the sequence of events that produces the condition found. One needs only to read the pathologic reports to comprehend this. There seems but little unanimity of opinion as to the starting point. Once a hematoma is formed in the ovary the pressure causes absorption and distortion of the delicate surrounding tissues, and makes it difficult or impossible to understand the condition in detail.

Clinically we may perhaps divide the cases of ovarian hemorrhage into three groups: (1) those due to rupture of the normal Graafian follicle or corpus luteum; (2) those occurring from a condition known as hematoma ovarii; (3) those occurring in ovarian cysts (or solid tumors). Although perhaps each case cannot always be so definitely classified, this offers on the whole, I believe, a convenient clinical grouping. I have already discussed the first group. Under the second —that of hematoma ovarii—the following case is a good instance:

M. N., aged twenty-four years, student. Of enteroptotic type and poorly nourished. Has a goiter with slight toxic symptoms. A question in the case as to an earlier tuberculosis of the lungs, although there are no signs apparent to ordinary examination. Has always had severe dysmenorrhea, compelling her to go to bed for a day or two. She has some bladder irritability and considerable vaginal discharge at times. The uterus was retroverted and fixed and there was a soft,

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fixed mass in the left cul-de-sac. On opening the abdomen the first thing that attracted attention was a little free bloody fluid in the cul-de-sac. The omentum had evidently absorbed some of this, for it was dark with blood. The left appendage was the size of a lemon and adherent. It was released with the uterus. Both tubes were normal; and the right ovary, although resembling somewhat in appearance the left, was normal in size and free of adhesions. On releasing the left ovary a quantity of chocolate-colored fluid escaped. There were numerous small cysts (follicles) in the ovary containing dark material. The appendix was entirely normal. The appendage was removed, leaving the right one, and correcting the displacement of the uterus by an intramural shortening. The patient has been markedly relieved by the operation.

No reason can be ascribed for the condition of the ovary. (The pathologist reported "hemorrhagic cyst of ovary.") There was no sign of any tubal or other infection. It is hardly conceivable that the simple displacement could have accounted for it. Here was hemorrhage not only into the ovary itself but from it as well. The process had produced adhesions.

Wolf[52] has reported eight such cases of hematoma of the ovary. In four of his cases the condition was complicated with myoma of the uterus, one with tuberculous peritonitis and in two with pelvic peritonitis.

Meriel[32] reports a case of dysmenorrhea in a patient, aged fourteen years, in which this condition was found. No reason for the occurrence could be discovered. There are many other cases of this group reported in the literature. There is chronic retention of blood in the follicles. The disturbance is first seen in the vascular tunica interna of the distended follicles—hemorrhage into the follicle follows. The hematoma presses upon the surrounding ovarian tissue and hemorrhage takes place into the stroma. The affected organ is surrounded by adhesions.

The condition is usually associated with some other condition, as Wolff has stated, to which it can be secondary. We have all seen it associated with pelvic tumors. These hematomas rarely give rise to severe hemorrhage. In many of the

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cases no cause for the condition can be traced, as in the case of Meriel and my own.

Third Group. One in which cysts of various sizes give rise to hemorrhage either into the tumor itself or externally into the abdominal cavity: The cause may be a torsion of the pedicle, or traumatism or perhaps it is not discovered. When cysts of any size are fixed in the pelvis by adhesions one very likely cause of hemorrhage has seemed to me to be trauma. Strains or falls might conceivably produce it. I personally know of one case in which such a cyst was ruptured from coitus, though in this particular instance without hemorrhage. Bleeding into an ovarian cyst may give rise to symptoms simulating ectopic pregnancy; a case of my own is in point.

K. P., aged twenty-seven years. No children but was operated five years previously for right tubal pregnancy. At this operation, which was performed some time after the rupture had taken place, there were many adhesions, and in freeing the left tube for inspection the fimbriated extremity was torn away. The rest of the tube was left *in situ*, with the hope that it might allow pregnancy. The right was removed, leaving two good ovaries.

In November, 1919, she was suddenly seized with pain in the lower abdomen, resembling somewhat her former attack. Pain decreased slowly; no signs of shock. At the end of about six days an examination revealed a fixed mass in the cul-de-sac, extending to the left pelvic wall. A repetition of her former trouble was considered.

At operation the appendage was found surrounded by firm adhesions, the ovary containing a cyst somewhat larger than a tennis ball. It was filled with blood-clot. The tube was closed and adherent to the surface. The appendage was removed, leaving a healthy right ovary. Recovery.

Michon[28] reports a case of torsion of the pedicle of a solid ovarian tumor, with hemorrhage into the abdominal cavity. (Hemorrhage into a cyst under the same conditions is not uncommon.) LeMoinet[27] reports a case of rupture of the pedicle of a dermoid cyst. Jayle[22] gives an extensive bibliography of hemorrhage from the ovary, and I would refer those in-

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terested to it. Many of the best articles appear in the bibliography appended to my paper.

Tubes. Hemorrhage from a non-pregnant tube is rare. I can find no instance in the literature of the last twenty years in which a violent hemorrhage has occurred that could not be questioned. Some bleeding into the tube, with clots, however, may occur, but I believe is uncommon. Bazy[4] goes into the pathology of three such instances, and I have in mind one instance in which I found a small amount of blood in a tube, the result of an old Neisser infection. Some bleeding into a tube the subject of torsion I have seen in a few instances.

Fibroids. An interesting group of hemorrhage into the abdominal cavity is formed by fibroids. This is aside from the hemorrhage from an ovary that is associated with such a tumor. Wallace[54] cites 17 cases (and 5 doubful ones) in which this occurred. The bleeding has often been a serious one and the mortality has been very high (25 per cent.). The hemorrhage has usually occurred from a vein or sinus on the surface of the fibroid by the establishment of an opening in some weak spot in the vessel wall. The yielding of the weak spot has been caused by some sudden effort on exertion, or as a result of increased tension in the myoma itself, consequent to torsion of the pedicle of a pedunculated tumor. In 4 cases the vessels were injured as a consequence of laceration of a solid myoma or in rupture of a cystic one; in one instance by an erosion ulceration caused by pressure of a bony projection against the tumor.

Gerstenberg[20] reports the case of a nurse who had been in the habit of lifting a heavy patient. She was seized with sudden faintness and at operation there was found a rent in the uterus from which severe hemorrhage had occurred. The myoma was removed and the patient recovered.

Wallace deals with the question as to just how these cases should be treated. He suggests that in view of the very high mortality, control of the hemorrhage alone should be undertaken, the removal of the tumor to be left to a more favorable time.

It is surprising that accidents of this kind are not more

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frequent. I have had no personal experience with them, but I very recently had reported to me by Dr. Wynand Pyle, of Grand Rapids, a case coming under his observation in which this accident probably occurred. The patient was a female, single, over fifty years of age. She fell accidentally on the street and was helped to her home. She became faint and short of breath. He saw her soon after and an examination revealed a hard tumor, evidently a fibroid, in the lower abdomen. She gave distinct evidence of a hemorrhage and died at the end of three hours unoperated. No autopsy was allowed.

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DISCUSSION ON THE PAPERS OF DRS. LITZENBERG AND SMITH

DR. J. WHITRIDGE WILLIAMS, Baltimore.—I have listened with great pleasure to these two papers. I shall first say a word or two about Dr. Smith's paper. The only personal experience which I have had with such conditions as he has mentioned has been in 2 cases of intraperitoneal hemorrhage due to bleeding from fresh corpora lutea. Both patients were operated upon. In one the ovary was removed, while in the other the bleeding corpus luteum was excised. Concerning the other matters which Dr. Smith has mentioned, I have had no personal experience, excepting in the case of ovarian hematomata. Concerning

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their origin I know nothing, and I regard it as one of the problems which is in urgent need of study and revision

Last night we had the very interesting demonstration of Dr. Litzenberg's specimens. The method which he has chosen for studying them is highly desirable and one which affords us very accurate and important information. For years I have done the same thing, and a great part of my knowledge concerning the histology of extra-uterine pregnancy has been gained in that way. It is a pity that many of his specimens were not more highly magnified, for owing to the lack of detail it was sometimes difficult to judge as to the correctness of his description. In general, his specimens illustrate conditions with which we are familiar and which show well what happens.

The great difference between uterine and tubal pregnancy lies, as he has quite correctly said, in the abundant decidual formation in the uterus and its scanty formation in the tube. As you know, the uterine decidua forms a thick and continuous membrane, but in the tube we never see such a structure, and the most we observe is the presence of a few isolated decidual cells. I agree with him when he says that in general the further we get away from the site of the tubal pregnancy the more abundant the decidual cells become; for in every instance in which I have seen a marked tubal decidua it has been in the non-pregnant tube.

It is my habit to teach students that the function of the decidua is three-fold: (1) To afford a nidus for the implantation of the ovum; (2) to afford a medium of nutrition for the ovum until the placental circulation has become established, and (3) and quite as important as the other two, to prevent the invasion of the uterine wall by the fetal tissues. Indeed, in the rare cases of spontaneous rupture of the uterus occurring in the early months of pregnancy, we practically always find the condition associated with imperfect decidual development.

I take it, therefore, that one of the very important functions of the uterine decidua is to prevent erosion of the maternal tissues. In the tube we do not get a well marked decidual reaction, and consequently the outcome of tubal pregnancy differs markedly from uterine. In both uterus and tube, we believe that the egg is implanted in the same way, and passing through the epithelium burrows into the tissue beneath it. In either event it dissolves away the cells immediately in contact

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with it by its trophic action. In the uterus it sinks down into the decidual tissue, but in the tube it passes directly down into the muscle and connective tissue, and this we see makes a wonderful difference. In both uterus and tube we find the periphery of the egg surrounded by a zone of degenerate tissue, the so-called canalized fibrin. In the uterus this remains sharply marked off from the decidua, whereas in the tube the fetal tissue comes in direct contact with the maternal and produces a widespread destruction, the chorionic trophoblast invading the tube wall like a malignant growth.

When I first began to study extra-uterine pregnancy, which was before our present ideas concerning the implantation of the ovum was established, I was very much interested to find that in all of the early cases the ovum lay entirely outside the lumen of the tube. At that time we believed that implantation occurred on the surface, and the egg became gradually walled off from the lumen by the upward growth of the decidua reflexa. Consequently, it was a great conundrum as to how the ovum came to lay outside of the lumen of the tube. In many instances we attempted to explain it by assuming that there had been a diverticulum from the lumen, which extended a varying distance out into its wall, and believed that the fertilized ovum had entered one of them, had been arrested at its distal end and had there undergone further development. Undoubtedly, this sometimes occurs, but even in such cases the egg at the time of implantation burrows down into the tissue just as in normal uterine pregnancy.

When we come to study the serotina or basalis, we find as Dr. Litzenberg has described, the great mass of the tissue made up of the fetal cells with very few of the decidual cells scattered among them. In unruptured tubal pregnancy, the egg is always separated from the lumen of the tube by a capsule, the so-called pseudocapsularis in which we get even fewer decidual cells than in the basalis. As the trophoblast proliferates about the ovum, it causes the same destruction as in the basalis, and as the capsule is, as a rule, thinner than the walls of the tube, rupture is more likely to occur through the former than through the latter, and we then have a satisfactory explanation for the more common occurrence of tubal abortion than of tubal rupture.

Indeed, I think that one of the very interesting things in connection with the history of extra-uterine pregnancy is the

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very remarkable change which has taken place in our views concerning the relative frequency of rupture and abortion. Twenty years ago the former was considered the almost universal outcome, and the latter as a pathological curiosity. But now we have come to believe that abortion occurs much more commonly than rupture, particularly when the ovum is implanted anywhere except in the isthmic portion of the tube.

Concerning the hemorrhage to which Dr. Litzenberg referred, we get very much the same conditions in tubal as in uterine pregnancy, and the changes which he demonstrated in many of his specimens are identical with those which occur in many cases of uterine abortion before the egg has become entirely separated from its attachment. Consequently, I think that the occurrence of hemorrhage either within the capsule, that is around the periphery of the egg, or outside of it, are conditions which are common to both uterine and extra-uterine pregnancy.

Dr. Robert T. Frank, New York City.—I will really confess that I was not able to follow Dr. Litzenberg in his demonstration last night. His sections were longitudinal. I have been in the habit of cutting these sections transversely. I see no particular advantage after having looked at his sections, in the longitudinal method of cutting, because there are only a few of them that are useful and these are the ones which give us a good general survey.

As to the comparison of tubal with intra-uterine pregnancy, I think there are absolutely no differences except such as can be accounted for by purely mechanical factors. Decidua in the tube lacks in thickness and varies in gross composition from that in the uterus. The tubal musculature and connective tissue do not respond by rapid and permanent hyperplasia, and hypertrophy to the stimulus of pregnancy as the uterus does. The uterus does this even in tubal pregnancy, rapidly enlarging and forming a perfect decidua.

The erosive action of the ovum destroys the decidua in the neighborhood of the ovum, and we see it to greater advantage outside of the ovular body.

Abortion is a misnomer because it is not an abortion, but an outgrowth into the lumen of the tube. This is purely mechanical.

As to physiological conditions, I recall a statement made many years ago by a member of this Society (Dr. Webster) that

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nidation can only take place in Muellerian tissue. The truth of this statement has become more and more likely in the last year or so, particularly under the influence of work done by Dr. Cullen, another member of this Society, who has pointed out that uterine glandular structures can be found scattered in places in the ovary, on the surface of the uterus, in the umbilicus and in the round ligament. I have been inclined to recall this statement and think that possibly there is something in it.

As far as the hemorrhage of tubal pregnancy is concerned, I think the sole differences between extra and intra-uterine nidation can be explained upon purely mechanical grounds.

Dr. Smith has covered the ground so fully in his paper that all I can do is to bring to your attention several personal experiences. These cases can be divided into two types. In one type of cases the intraperitoneal hemorrhage is of unknown origin. I know when I say this that I lay myself open to criticism, but I can say to you that in 3 cases I have been unable to find the cause of the hemorrhage. In 2 of them I removed the uterus. One was a fibroid with peritoneal tuberculosis. I found a small tear in a vein over the fibroid. Examination showed a fresh tear, and whether it was made in the hurry of exposure of operation I cannot tell you. The patient recovered.

The second case was one in which I found an enormous amount of blood in the belly. The patient died three days later. At autopsy I injected colored fluid into the vascular system and was unable to obtain any point of bleeding.

Another case was one in which I had made a diagnosis of a two months pregnancy with twisted ovarian cyst. I was called several hours later by the doctor who said the patient had a ruptured ectopic pregnancy. I found a two months' pregnant uterus and twisted ovarian cyst with the pedicle torn completely off during transport, the bleeding coming from the torn ovarian artery.

The last case was one in which a pelvic mass was discovered. I aspirated and obtained pure blood. I at once opened the abdomen and encountered a terrific hemorrhage, which was practically uncontrollable except by compression of the aorta. The woman died. At autopsy the condition found was an ectopic chorio-epithelioma; the pelvic tissues including the sacro-uterine ligament having been eroded. An aneurysmal mass formed by all the vessels in the neighborhood embedded in placenta-like tissue formed the source of the hemorrhage.

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DR. BENJAMIN P. WATSON, Toronto, Ontario, Canada.—I think it is a pity we should carry the nomenclature of intra-uterine pregnancy into that of extra-uterine pregnancy, especially with regard to the terms basalis and capsularis. As Dr. Williams pointed out, the ovum implants itself in the tube by a process of burrowing into the tube wall. In early tubal pregnancy, such as we saw last night in the demonstration of Dr. Litzenberg, there is no possibility of saying which is basalis and which is capsularis. These are young ova, the oldest about six weeks. In the tube I do not think we should retain these terms at all.

With regard to the distinction between rupture and abortion, to my mind they are essentially the same thing. One cannot have tubal abortion without a previous tubal rupture. In cases of so-called rupture, it takes place in the peritoneal aspect, but the ovum cannot get into the tube until it ruptures into the lumen of the tube from its position in the tube wall. There has been too great a distinction made between rupture and so-called tubal abortion. They are essentially the same thing. In both cases the ovum ruptures through the tube wall, through the peritoneal aspect, or through the mucous membrane into the lumen.

DR. DICKINSON.—Clinically there is a difference.

DR. WATSON.—Yes, clinically there is a difference. When rupture occurs in the lumen the hemorrhage is small and the symptoms less acute; but so far as the pathology goes, they are essentially the same.

DR. JAMES E. KING, Buffalo, New York.—I desire to report a case of abdominal hemorrhage from a large fibroid, which belongs in the group of cases described by Dr. Smith. The patient was a spinster, aged thirty-eight years, who had a fibroid the size of an adult head, and a femoral hernia of the left side. In the early morning hours she was seized with severe pain in the abdomen associated with vomiting. She noticed the femoral hernia had descended and was giving her pain. The family physician who was called regarded it as an intestinal attack without attaching any importance to the fact that her hernia was out. I was asked to see her in the afternoon. At this time

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the hernia seemed to be a factor in her case, as I found on trying to replace the hernia it did not go back. I was also struck with the peculiar doughy feel which the mass presented. We took her to the hospital and operated and in opening the hernial sac found it contained a clot of blood with some free blood around it. The abdomen was opened through a transverse incision, and a fibroid the size of an adult head was found. On the fundus and anterior surface was a clot of blood, to which was loosely adherent a portion of the omentum. Upon releasing the omentum a very considerable hemorrhage took place from a ruptured vein. The abdomen was filled with blood as one would find in early rupture or tubal abortion. The tumor was removed, and upon examination I found no particular reason for the ruptured vein except in a part of the tumor there was considerable edema and cystic change which I presume caused rapid growth and stretched the vein which lay across the surface of the tumor.

Dr. Jennings C. Litzenberg, Minneapolis (closing the discussion on his part).—Dr. Williams will have to take my word for the accuracy of the demonstration because I only showed one slide, and the demonstration was the result of studying 200 consecutive slides to prove the point.

As to the hemorrhage in extra-uterine pregnancy and the hemorrhage in the uterus, I tried to make clear that in so far as implantation was concerned, the implantation in the tube and uterus is identical. The differences are anatomical and histological. In the tube there is very little stroma, very little decidua, there is very little tube wall, therefore it is easy of perforation. I will not stop to talk about the mole.

Dr. Frank says there is no advantage of longitudinal sections over the transverse or cross-sections. My reason for longitudinal sections is that in making these sections I had only 600 slides of each tube, and in the cross-sections I would have 2000, and being more or less lazy I could study the 600 sections easier than 2000 if I wanted to study the whole tube.

Dr. Richard R. Smith, Grand Rapids, Michigan (closing the discussion).—I have no doubt many of you have seen instances in which these hemorrhages have occurred but the cases have not been reported. In cases where hemorrhage has occurred intraperitoneally, from fibroid tumors, oftentimes it

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has been difficult to find the source of the hemorrhage for reasons which are apparent. The tumors are large, the number of bloodvessels is large, and oftentimes they are not bleeding at the time the patient is operated, and it is impossible to tell exactly where the hemorrhage came from. The point to be borne in mind is the possibility of this accident in cases of fibroid tumors.

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ERRORS IN GYNECOLOGIC DIAGNOSIS DUE TO MISPLACED ORGANS

By Reuben Peterson, M.D.
Ann Arbor, Mich.

Progress in obstetrics and gynecology is denoted, among other things, by greater accuracy of diagnosis. When mere opening of the peritoneal cavity, more often than not, meant death from general peritonitis much thought and time was spent on preoperative diagnosis. When it was demonstrated beyond doubt that by proper precautions the peritoneal cavity could be invaded with impunity, preoperative diagnoses of gynecologic, pelvic and abdominal conditions became less accurate and often were not made at all. It has been so easy to excuse our intellectual laziness in diagnosis by saying that it makes no difference, since the correct diagnosis will be made after the abdomen is opened.

We all know this is false reasoning. In certain cases the diagnostic abdominal incision is directly contraindicated and may shorten the life of the patient, even if immediate death does not result. Poking around in the pelvic and abdominal cavities, trying to make a diagnosis in a few moments when such diagnosis could have been made prior to operation by modern diagnostic methods, is crude surgery and should be done away with.

The present paper was suggested by a recent case, rare to be sure, but easily diagnosticated had it been approached systematically and not hastily and carelessly. It is the same

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story with the other four cases which will be reported. In each the correct diagnosis could have been arrived at fairly easily had the histories and physical signs been more carefully considered and analyzed.

CASE I.—Prolapse of the right Fallopian tube through colpotomy incision mistaken for granuloma. Removal of piece for diagnosis followed by severe hemorrhage.

Mrs. H. J. A., aged twenty-nine years, married, was operated on in June, 1918, for a large pelvic abscess occupying principally the right side of the pelvis. The posterior cul-de-sac was widely incised, the abscess emptied and the sac drained. The patient made a good recovery and gained thirty pounds in weight after leaving the hospital. She was examined January 10, 1920, for local pain and tenderness. Since the previous operation she has never recovered her health. She tires easily and is unable to do her work. Bimanual examination showed both appendages adherent and tender. The uterus was enlarged and fixed in the pelvis. At the site of the previous posterior colpotomy incision to the right of the median line could be felt an adherent irregular mass the size of the end of the little finger. Through the speculum the mass was seen to be irregular and reddish, like a cock's-comb. The conclusion was that the mass was probably a granuloma at the site of the old colpotomy incision. In order to be more certain a small piece was snipped off with the scissors. A sharp hemorrhage followed which could only be checked by gauze packing. However, even with this evidence the tissue was thought to be granulomatous until the pathologist, Dr. C. V. Weller, reported the removed tissue to be a portion of the Fallopian tube.

January 28, 1920, the abdomen was opened and the microscopic diagnosis confirmed. The right ovary was bound down by adhesions in the posterior cul-de-sac while a third of the fimbriated end of the tube projected through the vaginal wall and was adherent to the walls of the aperture. The right tube and ovary and the left tube were removed. The patient made a good recovery.

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Here was a case in point. There was no reason why a clinical diagnosis should not have been made had greater care been taken in the examination. It is no excuse to say that owing to the situation of the prolapsed tube in the vault of a long and rigid vagina it was difficult to secure a good exposure of the prolapsed tube. It was the business of the examiner to overcome such difficulties. The bleeding subsequent to the removal of the section of the tube should have aroused suspicion that the tentative diagnosis of granuloma was probably incorrect. A granuloma when incised does not bleed as did the tube. To be sure the correct diagnosis was arrived at prior to operation, but there was no intellectual satisfaction on the examiner's part connected with it because it was made by the pathologist.

The case also illustrated the peculiar trend of our minds when trying to arrive at diagnoses of unusual conditions. I knew this was an unusual case, since I had never seen an adherent mass like this subsequent to a colpotomy, although I have performed a good many hundred for purulent collections within the pelvis. Instead of carefully and systematically considering all the findings in this case whereby a correct diagnosis might and probably would have been arrived at, I jumped at conclusions and held to these conclusions until they were proved absolutely wrong by the microscopic examination.

The same thing will be found to be true in practically all the cases of errors in diagnosis which follow. The correct diagnosis could have been made in each instance if the facts in the examiner's possession had been carefully and systematically considered. As has been well said, it is not lack of knowledge but a failure to use our knowledge that leads to mistakes in diagnosis.

So far as this particular case is concerned a fairly careful search of the literature fails to show a similar case reported. The nearest approach to it is prolapse of the appendages through rupture of the posterior vaginal wall. Cousins in his address on ovarian hernias and the protrusion of the appendages through rupture of the vaginal wall has thoroughly covered

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this subject and reports quite a few cases. The misplacements of the organs in his cases are preceded by quite a different history. According to Breisky the rupture of the vaginal wall occurs almost exclusively in labor or during the puerperium. Grenser reports a case in which a pregnant woman suffering from ascites had a prolapse of the retroverted uterus and appendages through a tear in the posterior vaginal vault. Cousins reports a prolapse through a ruptured posterior vaginal wall of the ovary and tube in the case of an insane patient suffering from uterine prolapse due to persistent efforts on the part of the patient who had suffered for some time from uterine and rectal prolapse. It would seem at first glance as if prolapse of the ovary with the tube would be easier to diagnosticate than when the tube is prolapsed alone. However, this is mere conjecture. The main thing to bear in mind is that prolapse of the appendages is possible after incision or rupture of the posterior vaginal wall.

MISPLACEMENT OF THE KIDNEY. There may be either a congenital or acquired misplacement of the kidney, and in either condition the organ, whether normal or diseased, may lead to errors in diagnosis. This is well shown by a review of the literature in which the kidney has been reported as mistaken for an ovarian tumor, solid or cystic fifteen times, cystic or solid tumors of the tube alone or with other organs fourteen times, solid or cystic ovarian growths with the possibility of other organs beside the kidney being involved six times and hematometra five times.

The following case illustrates how easily hydronephrosis may be mistaken for an ovarian cyst.

CASE II.—Cystic kidney situated in the median line, apparently arising from the pelvis mistaken for an ovarian cyst.

Mrs. S., aged sixty-four years, widow, was admitted to the hospital November 18, 1903. The menopause had been established sixteen years. She had always been in fair health up to the beginning of the present trouble. Three months ago she was told she had a tumor, although she thinks her trouble

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started a year ago with pain in the right side and lumbar region. At times she is sick at the stomach and has pressure symptoms and pain at stool. Examination showed an extremely thin woman with marked atheromatous arteries. The abdomen is regularly distended by a mass which reaches from the pubes to the epigastrium. The tumor is slightly more prominent on the right than on the left side. On the right it reaches to the anterior superior spine and extends upward to the border of the ribs; on the left it is within two finger-breadths of the anterior superior spine and almost to the border of the ribs. The umbilicus protrudes. The growth is smooth, elastic in feel and apparently is cystic. The percussion note is flat on the right but somewhat tympanitic on the left side. By vaginal examination the tip of the finger just reaches the growth at the brim of the pelvis. The uterus is atrophic, the appendages not made out.

The diagnosis was cystadenoma of the right ovary and the patient was operated on November 19, 1903. On opening the peritoneum a blue-walled cystic tumor presented. The peritoneum was in front of the tumor, the cecum to the left and overlapping the growth. The cystic mass was found to arise from the right flank and was connected with the pelvis. The left kidney was palpated and found to be normal in size and position. The peritoneum was incised and the cystic kidney removed. The patient made a good recovery.

Here again were all the facts for making a correct diagnosis had they been put together in the proper manner. There was a distinct history of pain in the right side and flank, unusual to say the least, with cystadenomata. Moreover it was exasperating to have dictated the finding that there was decided tympany over the left side of the tumor, yet to have made no use of such data because the conclusion was jumped at that one was dealing with the very common cystadenoma.

A history of pain in the flank must always be regarded as indicative of the renal origin of cystic neoplasms until the contrary has been proved. Today it is the surgeon's duty to make a preoperative diagnosis in every cystic abdominal or pelvic

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growth. If there be a distinct history of the pelvic origin of the growth, and if the abdominal and pelvic findings confirm the diagnosis of an ovarian cystadenoma, it may be unnecessary to make use of other methods of examination in the differential diagnosis. In all doubtful cases, however, it is absolutely essential in the interests of good surgery to employ all urologic methods to establish the diagnosis. The cystoscope may reveal no urine coming from the ureteral orifice on the suspected side or it may show the urinary flow to be continuous in contrast with an intermittent flow from the other orifice, thus denoting hydroureter with or without intermittent hydronephrosis. In doubtful cases it is essential to employ the functional tests after ureteral catheterization in order to determine the integrity of each kidney. The same may be said as to the value of pyelography in difficult or obscure cases.

A review of the literature shows that in the large majority of cases in which cystic kidneys were mistaken for ovarian cysts the preoperative diagnoses could have been made had the examiners given more consideration to the possibility of the growths being renal in origin.

Curiously enough, notwithstanding the lesson learned from the above case which I spoke of many times in my clinic when the differential diagnosis of ovarian cysts was under discussion, one of my former assistants, Dr. Ward F. Seeley, during my absence, made the same error in diagnosis as follows:

CASE III.—Enormous cystic left kidney reaching from the pubes to the ensiform mistaken for an ovarian cyst.

Mrs. G. L., aged forty-seven years, entered the University Hospital February 10, 1915, complaining of enlargement of the abdomen of four years' standing. Four years ago she discovered a firm, solid mass, the size of a grapefruit, in the lower left abdominal quadrant. During the four years there has been a gradual increase in the size of the abdomen but no symptoms aside from the inconvenience of the enlarging abdomen. There have been no fever, chills, nausea, vomiting or jaundice. The general health is excellent.

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Examination showed the patient of moderate frame and good nutrition, with an abdomen enlarged, especially in the left lower quadrant. The highest point of the swelling is three inches below and to the left of the umbilicus. Palpation shows the tumor apparently arising from the pelvis and filling the left lower abdominal quadrant. It reaches almost to the ensiform and extends well into the right upper and lower quadrants. The mass is freely movable and easily displaced to the right side of the abdomen. The smaller upper pole of the mass is firm and hard; the larger lower pole is distinctly cystic. The tumor is easily palpable through the posterior cul-de-sac and gives a distinctly cystic feel to the examining finger. The diagnosis of multilocular ovarian cyst was made and the patient operated on February 16, 1915. At operation the uterus was found displaced backward by a cystic tumor which extended from the pelvis to the ensiform. Both ovaries were normal. The colon was stretched over this mass, which was retroperitoneal and arose from the left kidney. The right kidney was palpated and found normal. The cystic kidney was aspirated and 2200 c.c. of fluid removed. The kidney was removed in the usual manner and the patient made a good recovery.

This case was quite similar to the other case of hydronephrosis except that the disease was of longer duration and the cystic destruction of the kidney much greater. It shows how easy it is to be mistaken in the origin of a cystic mass, a part of which lies in and can be palpated in the pelvis. It also illustrates how important it is to outline carefully the uterus and appendages as an aid to diagnosis. Rectal examination is often very valuable in such cases and should always be used in the presence of cystic growths no matter how simple the diagnosis may appear.

The history of a round mass in the left lower quadrant four years before entrance to the hospital should have aroused suspicion that the origin of the growth might be elsewhere than in the ovary. At times the patient may be mistaken regarding the time of appearance or the early location of the growth,

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but usually such testimony is valuable, since if the patient is intelligent enough to notice a growth she is liable to have fairly accurate information regarding it. At least her story should be given credence until proved by other findings to be inaccurate. More often it is the examiner's fault in that he approaches the case with preconceived ideas of the diagnosis based upon findings pointing to a common disease leading to a scant consideration of points in the history which may be all important.

Aside from a cystic kidney which may be mistaken for an ovarian cyst, the movable or floating kidney or the congenital pelvic kidney may give rise to errors in diagnosis. Movable kidney is met with so frequently in women that the examiner is almost always on the lookout for it, and therefore recognizes the condition by the usual signs. In rather exceptional cases in which the movable kidney lies within the pelvis it may give rise to confusion until doubt is solved by replacement into its position in the flank. Movable kidney with torsion may be difficult to distinguish from an ovarian cystic or solid tumor with a twisted pedicle. The pain, however, when the pedicle of a movable kidney is twisted is local in the renal or epigastric region while the pain of a twisted pedicled cyst is lower down and there is more general peritoneal involvement. In case of doubt it is easy to settle definitely whether the tumor be renal by ureteral catheterization or the Roentgen-ray.

The congenital pelvic kidney being more uncommon and immovable as a rule is more likely to be either overlooked or mistaken for a genital tumor. The following case illustrates such an error:

CASE IV.—Pelvic kidney in a woman without a vagina mistaken for hematometra and punctured through an incision made between the bladder and the rectum.

Miss M. Z., aged seventeen years, single, was examined June 23, 1911. The patient has always been healthy with the exception of never having menstruated. There has never been anything suggestive of menstruation, either a discharge of blood from the vagina or menstrual molimina until Christmas,

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1911, when she had a spell during which she felt very nervous, blue and very irritable. Although she had no particular pain she was obliged to go to bed for three weeks. There have been a number of similar attacks since, during which there has been a dull ache in the lower abdomen but no sharp pain.

Examination showed a well-developed and nourished girl, perfectly normal so far as the breasts, pubic hair and feminine characteristics were concerned. The clitoris and labia were normal, but there were no signs of an introitus. The meatus urinarius admitted the tip of the little finger with ease and there was some eversion of the mucous membrane. Rectal examination failed to reveal with distinctness either uterus or appendages, but did show a globular mass just at the end of the examining finger.

The conclusion was at once arrived at that the condition was one of hematometra, and on June 27 the tissue between the rectum and the bladder was dissected upward for a distance of three inches through a transverse incision. At this distance the mass could be distinctly made out and with the idea of emptying the uterus of blood and establishing a communication with the outside a scalpel was thrust upward into the same. The result was not as expected, for upon withdrawing the scalpel there was a terrific hemorrhage, the bright red blood differing greatly from retained menstrual fluid. The hemorrhage was so sharp that it could only be stopped by tight gauze packing. The diagnosis now was plain, absence of vagina and uterus together with a pelvic kidney. For a number of days samples of urine showed large amounts of blood, which gradually diminished. On July 5 an artificial vagina was formed by means of flaps taken from the labia and buttocks. She married soon afterward and the vagina was found serviceable.

At the risk of being tiresome it is again pointed out that the error in diagnosis was due to the same causes which led to the mistakes in the three previous cases. So sure was I that I was dealing with retained menstrual blood that I proceeded to empty the uterus in a manner which might have led to fatal

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results. There is very little satisfaction in having the diagnosis in a case like this thrust into your face. To be sure the woman did not die from the hemorrhage, but this was due to no foresight on my part. All this could have been avoided by raising the query as to whether the pelvic tumor might not be renal in origin and determining the exact position of the kidney or kidneys by modern methods.

Cullen reports an almost similar case of a right pelvic kidney, absence of the left kidney, absence of the vagina and the uterus and both ovaries in the inguinal canals. The diagnosis of hematometra was made and the tissue between the bladder and the rectum dissected for a distance of five inches. Then doubt was thrown upon the diagnosis and the abdomen was opened, showing the true condition of affairs.

Engstroem made a diagnosis of hematometra in a young girl, aged seventeen years, who lacked both vagina and uterus. Laparotomy showed a pelvic kidney, and the operation was completed by removal of both adnexa, an unjustifiable procedure in the light of our present-day knowledge.

Von Kubinyi reports the case of a girl, aged nineteen years, who had never menstruated. Rectal examination showed the presence of a round tumor which was thought to be a hematometra. The tissue between the bladder and the anus was dissected up to the peritoneum. As the tumor could not be reached from below the abdomen was opened and the tumor found to be a sacral kidney.

Buss removed a pelvic tumor from a girl, aged twenty-one years, who showed absence of the vagina and had suffered from colicky pains, the original diagnosis having been hematometra. The patient died in seven days from uremia and a microscopic examination of the removed tumor showed it to be a kidney. The other kidney was not found at the autopsy.

Other cases have been reported of death following the removal of pelvic kidneys showing the danger of such procedures as congenital anomalies are liable to be multiple. In the light of our present knowledge suspicion should at once be aroused as to the renal nature of any mass in the pelvis where absence

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of the vagina, in whole or part, exists. Again it may be stated that it is an absolute necessity to obtain complete information regarding the genito-urinary apparatus before any operation be attempted.

MISPLACEMENT OF THE SPLEEN. The so-called wandering spleen has given rise to more errors in gynecologic diagnosis than has the movable or pelvic kidney. A partial review of the literature shows that wandering spleen has been mistaken for an ovarian tumor, cystic or solid, thirty-five times; ovarian tumor or some other genital organ six times; uterine tumor seven times, with other scattering mistakes in diagnosis.

The diagnosis of wandering spleen may be easy or exceedingly difficult, dependent upon the size of the woman afflicted, the position of the spleen and whether it be movable or fixed by adhesions. The difficulty of diagnosis is illustrated by the following case, in which the diagnosis was not made until after operation.

CASE V.—Wandering spleen adherent in the pelvis and resting upon the retroverted uterus mistaken for a uterine fibroid. Removal and recovery.

Mrs. E. W., aged thirty-nine years, married, was admitted to the University Hospital November 8, 1901. The patient was very obese, weighing in the neighborhood of 300 pounds. Her present trouble dated from the age of nineteen when she had a severe fall. For months she was unable to walk and suffered from severe pain in the lower abdomen. The attacks seemed to have no connection with the menstrual periods. Abdominal and pelvic examinations were extremely difficult on account of the obesity of the patient. However a pelvic mass, more solid than cystic, could be indistinctly made out in the lower abdomen, rather more to the right than to the left. The mass was quite tender and rested upon the retroverted uterus. A diagnosis was made of probable uterine fibroid, and to save the obese patient a laparotomy, if possible, the anterior cul-de-sac was opened. A large adherent mass could be felt just at the tip of the finger, resting upon the retroverted uterus.

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Its size preventing removal through the vagina, the abdomen was opened by an incision reaching from the pubes to the umbilicus. The tumor was found to be a displaced spleen adherent to the vesicoparietal peritoneum, with its lower surface resting upon the retroverted uterus. The pedicle was ligated and the spleen removed. The patient made a good recovery and showed no ill-effects from the removal of the organ, her symptoms being entirely relieved.

Displacement of the spleen is not uncommon in women, especially married women during middle life. If the spleen be displaced but nonadherent the diagnosis is not especially difficult if one keeps in mind the possibility that the spleen, like the kidney, may be movable. When it has been displaced and is adherent in the pelvis or at the pelvic brim the diagnosis may be extremely difficult, as in the case just reported, where it was thought to be a uterine fibroid. I have removed solid fibroid tumors of the ovary shaped not unlike a spleen with a notch in the middle of the growth. It is not always easy to palpate the splenic notch in wandering spleen, since the organ, as it descends from its normal position, tends to become horizontal and the notch to be drawn backward and upward. These facts, together with the increase in size of the spleen due to edema and congestion, can give rise to frequent errors of diagnosis so far as palpation is concerned. Unless the peritoneal surface of an ovarian cyst or pedunculated uterine fibriod is or has been the seat of infection there will be no tenderness on palpation, in contradistinction to the prolapsed spleen which without torsion of the pedicle or evidence of peritoneal inflammation is quite sensitive on palpation. A study of the reported cases of wandering spleen shows that the condition cannot be excluded because a mass lies to the right of the median line. On the contrary such a spleen can occupy any position in the abdomen or pelvis in which a tumor of the right or left ovary may be found.

When the pedicle of the spleen has become twisted the difficulties of diagnosis become increased, since the pain and sensitiveness may be the same in degree and location as when the

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pedicles of tumors of the genital organs become twisted. As in the case of cystic and solid tumors of the kidney the history may be of the greatest value in the differential diagnosis of wandering spleen. A history of a fall or injury and the slow, gradual descent of a mass from under the left ribs should always arouse suspicion as to the possibility of a tumor being a wandering spleen.

It appears as if the new method of abdominal diagnosis, pneumoperitoneum, when the outlines of the abdominal and pelvic organs are shown by the roentgen-ray after the injection into the peritoneal cavity of nitrous oxide or carbon dioxide gas holds out the greatest possibilities regarding the diagnosis of wandering spleen. If this method of diagnosis, after its technic has been perfected, fails to show the spleen in its normal position, but shows a tumor elsewhere, it is strong evidence that the tumor is splenic no matter the position or whether it be adherent or free.

Other misplaced abdominal organs have led to errors in gynecologic diagnosis. For instance, Chadwick reports a most interesting case in which a prolapsed stomach was aspirated through the posterior cul-de-sac under the impression that a pelvic abscess was being emptied. In two instances the enlarged and prolapsed liver has been mistaken for an ovarian cyst, while the prolapsed enlarged gall-bladder has been incorrectly diagnosticated as ovarian cyst in at least five cases. However, such errors of diagnosis will be merely referred to, since I have no personal cases to record.

Conclusions. 1. Mistakes in gynecologic diagnosis arising from misplaced organs are not uncommon, as shown by the literature in which only a small proportion of such mistakes is probably recorded.

2. Such errors in diagnosis arise from either carelessness or preconceived ideas of diagnosis, whereby important facts in the history and equally important physical findings are either overlooked or ignored.

3. Such diagnostic errors can be averted by greater care in systematically considering with a free mind the facts in the

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case relating to the history and physical findings, provided the latter are obtained through the employment of the most modern methods of examination.

4. In every case a preoperative diagnosis should be made and recorded in order to profit by mistakes revealed at the operation or autopsy.

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DISCUSSION

Dr. George Gellhorn, St. Louis, Missouri.—Confession is good for the soul, and I am glad to confess one of many mistakes I have made. This case concerns a multipara, aged thirty-seven years, who presented herself with symptoms of acute peritonitis. A large tumor was found in the lower right quadrant of the abdomen intimately connected with the uterus,

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and I made a diagnosis of ovarian tumor with twisted pedicle. The diagnosis was not quite as clear as I would like to have had it because of the configuration of the tumor and its consistency, but that was the best I could do. On operation I found an enormous malarial spleen which not only traversed the entire abdomen downward into the right half and had become firmly incarcerated between the uterus and the right pelvic wall, but it turned a complete somersault, so that the upper pole of the spleen was in the depths of the cul-de-sac, while its tail stuck out under the region of the appendix.

Dr. Joseph Brettauer, New York City.—We have all made mistakes in diagnosis. Sometimes they were justifiable, and sometimes they were due to lack of proper appreciation of the symptoms or to carelessness. There are, however, instances where in spite of the utmost care we are not able to make a correct diagnosis. I am thinking at present of a very old case of mine, and also of a recent case.

Some twenty years ago I had reason to believe that I had to deal with either an ovarian cyst with a long twisted pedicle, or with a tubo-ovarian cyst or hydrosalpinx. On opening the abdomen I found an adenocarcinoma of the ascending colon, with a very long mesocolon, which was just as movable as if it had arisen from the adnexa. There were no symptoms whatever from the intestinal tract. I resected a large portion of the intestine, and the woman is still well.

A counterpart of this case is one I operated on two weeks ago. While my diagnosis was not certain, the probability as to the existing condition in my mind was one of two things, an atrophic adherent fibroid or a malignant condition of the appendages. The woman had passed the climacteric; she had a mass in the pelvis which was tightly adherent and intimately connected with the uterus. There were no signs whatever of involvement of the intestinal tract. I made a rectal examination digitally and with a proctoscope. On opening the abdomen I found the mass I had felt was the lower part of the sigmoid so tightly adherent to the posterior wall of the uterus that it could not possibly be separated from the uterus. After tying off both broad ligaments and cutting through the vagina, I lifted the uterus and sigmoid out of the abdominal wound, resected the sigmoid, made a lateral anastomosis. The specimen presented an enormous angular adenocarcinoma of the sigmoid.

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DR. HENRY T. BYFORD, Chicago.—I should like to call attention to an interesting kind of tumor sometimes found in the cul-de-sac of Douglas during pregnancy. I have 2 cases in mind. One of the most eminent surgeons in this city wanted me to operate on his wife for a tumor in the cul-de-sac. I told him to let the tumor alone and she would come through pregnancy all right. She did. Another doctor had discovered a tumor in the cul-de-sac of a pregnant woman and wanted me to operate. I declined to do so, and she had no trouble from it. The mass was the prolapsed omentum in both cases. My attention was first called to this condition by a mistake in diagnosis. I diagnosed a tumor in the cul-de-sac, I cut through the posterior vaginal vault and came upon the omentum. As there were no adhesions or other pelvic pathology I let it alone.

DR. J. WESLEY BOVÉE, Washington, D. C.—It is rather discomforting to hear this report of mistakes in regard to ovarian tumors and operation for the removal of them, yet we must remember the first nephrectomy was done for this same mistake by Wolcott in 1858 in Milwaukee. It is a thing we have not learned since 1858 in a special line though he blazed the way for us.

It is easy to be seen in this work that nearly all the mistakes could have been avoided by a careful study, and it is particularly an illustration of that habit depicted in the human individual, of keeping away from the regular line of work and falling into careless ways.

DR. N. SPROAT HEANEY, Chicago.—I had a case similar to the one which Dr. Peterson reports of a tube prolapsing through the vaginal vault after hysterectomy. I did a vaginal hysterectomy on a woman, leaving the tubes and ovaries behind. The patient made an uneventful recovery but returned in a few weeks complaining of a very profuse leukorrhea. In my office, upon the introduction of a speculum into the vault of the vagina, I saw a granulomatous appearing projection which I, like Dr. Peterson, thought that I might remove at the time. Upon seizing it with tissue forceps, however, preparatory to snipping it off, the tube came out into the vagina. I removed the patient to the hospital and was able, under full surgical anesthesia, to enlarge the opening in the vaginal vault sufficiently to allow

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the complete escape of the tube, and by ligating off the blood supply, was able to remove the tube without further incident.

I do not know how else I could have arrived at the diagnosis except as I did and as Dr. Peterson did, because I was perfectly unfamiliar with such a possibility.

Dr. Hiram N. Vineberg, New York City.—If every one of us made a confession of his mistakes and was sincere about it, we could take up a couple of days in telling our errors even if we limited them to misplaced organs.

A point I wish to emphasize in Dr. Peterson's paper is that an ectopic kidney is usually a single kidney, and when one comes across a misplaced kidney he ought to be careful, before removing that kidney and make certain the presence of another kidney. This can be done readily by exploring with the hand through the abdominal incision.

Dr. Charles G. Child, Jr., New York City.—A patient, aged twenty-one years, para I, a difficult instrumental delivery two years ago, was operated upon by me July 15, 1905. A curettage and repair of the cervix was done. A transverse suprapubic incision was made and the adnexæ of both sides freed from adhesions, the left pyosalpinx removed, and the right tube resected for chronic salpingitis. The uterus was replaced; and the round ligaments shortened. The pathologic report on the cervical tissue removed was carcinoma. On July 22, a vaginal panhysterectomy was performed. The convalescence from both of these operations was uneventful, and there was a marked general improvement of the patient's condition during the following year.

In October, 1907, she complained of considerable loss in weight with pain in the pelvis, more particularly on the left side. Examination at this time showed nothing abnormal in the pelvis. She was again seen in December, complaining of an aggravation of all these symptoms to which was added marked gastro-intestinal disturbance. Examination showed considerable tenderness of the vaginal vault with marked induration and thickening around the broad ligament stump on the left side. Bimanual examination gave the impression of a recurrent growth in this region. The patient had grown progressively weaker since the examination in October, and there had been a

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very marked loss in weight. No cachexia was apparent, and she did not look as though she were suffering from a malignant process, notwithstanding the fact that all the clinical findings seemed to point toward a recurrent growth. On December 6, 1907, a median line incision was made, and beyond some few large intestinal adhesions in the pelvis at the site of the previous operation, no evidence of any recurrent growth was found. A large and congested spleen lay in the left side of the pelvis, slightly adherent to the broad ligament stump. The splenic vessels formed a long pedicle measuring nine inches in length. No evidence of a splenic mesentery was found. The adherent spleen, which was felt by bimanual examination was what had been taken to be a recurrence of the original growth in the cervix. The spleen was freed from adhesions, an incision made at, and parallel to the free border of the ribs on the left side. The peritoneum was separated from the fascia, making a pocket into which the spleen was transferred, and it was then sutured behind the spleen, leaving only a small opening for the splenic vessels. The fascia and skin were closed; modified Bardenhein's technic.

The patient made an uneventful convalescence and was entirely relieved of the abdomino-pelvic pain of which she complained before the operation. She made a rapid gain in weight, and has been perfectly well up-to-date. The spleen has remained in its new extraperitoneal situation without causing any symptoms, and six months after the operation it had returned to practically normal size.

Dr. Reuben Peterson, Ann Arbor, Michigan (closing the discussion).—Dr. Brettauer has nothing on his conscience. He made use of all methods of diagnosis, yet the preoperative diagnosis was not made. That was not the point of my paper. My paper was written because I thought it was well to point out the need of a more careful examination in all these pelvic conditions, and not jump at the conclusion that we have one condition, and not utilize all methods of examination before operation. We will make mistakes in diagnosis because we are human, but there are many new methods of diagnosis being perfected at the present time which will make our diagnoses more accurate. Among these may be mentioned *x*-ray examinations after gas injections of the peritoneum. If we will

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exhaust all methods and put ourselves clearly on record as to the preoperative diagnosis and then check up with the operation and the autopsy, it will be of great advantage. For instance, representatives from the American College of Surgeons in going around and investigating different hospitals found it is comparatively rare for a diagnosis to be made and recorded prior to operation. My paper has served its purpose if it has shown the necessity of careful examination and diagnosis in all our cases.

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RADIUM AS AN EDUCATIONAL FACTOR IN THE TREATMENT OF UTERINE CANCER

By William S. Stone, M.D.
New York City

In the consideration of the subject of educating the profession and the public in all matters pertaining to cancer the writer would emphasize the important position which the American Gynecological Society has assumed through its efforts, in conjunction with those of other organizations, to create and maintain a national society for the control of cancer. Public health education, however, has become such an important field for the medical profession that it would appear as if the American Gynecological Society, possessing through the positions of its members a special opportunity for the study of uterine cancer, must maintain a position of leadership by relating its activities more directly to the educational needs of the public in this subject.

If the introduction of radium as a therapeutic agent in uterine cancer has done little else, it has immeasurably added to our interest in the study of cancer, and to those of us who are engaged in institutional work the increased amount of clinical material which the primary results of radium have already attracted has afforded a clear insight into the slow progress that has been made in combating the disease, and gives us a special knowledge of the direction toward which our efforts should be directed in improving the situation. The suggestions in this paper are based upon the observation of over 400 cases of uterine cancer which have applied to the Memorial Hospital during the past four years.

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The most serious fact observed in a review of this material is the small number of cases in which the lesion at the time of the patient's application to the hospital is limited to the uterine tissues. There is little opportunity, therefore, to study the gross features of the disease during its early stages. For our educational purpose, therefore, there is a great need for defining, if possible, how closely related histogenetically are the numerous benign lesions which have been indifferently discussed for many years. It would appear as if the reports and detailed description of the gross features of early lesions would offer a profitable field for frequent discussion. In three such cases that the writer has recently observed the picture of a typical erosion extending over a relatively wide area was remarkably well preserved, and, except for the induration of the underlying tissues, the diagnosis of cancer could not have been made without the aid of the microscope. The work of Schottlaender-Kermauner and others leads one to suspect that cancer of the cervix relatively often covers superficially a large area before infiltration of the deeper tissues reveals its nature. In short the clinical diagnosis of cancer of the cervix cannot be made until some destructive qualities appear. There are no symptoms, therefore, of beginning cancer, and unqualified statements to that effect must be made to the public and the profession. It must be particularly emphasized that pain is never a symptom of cancer until the growth is well advanced. In asking patients for the reason of their delay in consulting a physician the absence of pain is almost invariably given as one of their reasons. Similarly, in regard to discharge, no importance is attached to its presence, unless it is malodorous, which, of course, we know is never present until the later stages of the disease. How, therefore, can we meet the educational problem without publicly teaching that every woman who has borne children must be examined by a competent physician after she has reached a certain age, and from whom shall such advice come with more scientific authority and with more wisely directed methods than from members of this society, acting, perhaps, not as individuals but

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as representatives of the society? The age at which examinations should begin merits a discussion because of the frequency with which uterine cancer begins during even the early years of the fourth decade. Of 244 cases at the Memorial Hospital 58, or 24 per cent., occurred in women under 40, and 30, or 12 per cent. were under 35.

The earliest symptom of uterine cancer, and often the only one for a considerable period after the growth has become well established, is atypical bleeding, which is so often misinterpreted by both the patient and physician until pain or some accidental events suggests its importance. A review of the records of 139 cases shows that the time that passed from the beginning of atypical bleeding until they applied at the hospital was as follows: 25 per cent. applied within three months; about the same percentage within from four to six months, or slightly less than 50 per cent. within six months; 14 per cent. between six and nine months after beginning of bleeding, making a total of 63 per cent. within nine months; about 20 per cent. within the following three months, making a total of about 80 per cent. who applied within the first year after bleeding first appeared. About 20 per cent., therefore, did not apply until atypical bleeding had continued for one year. The delay, however, was not entirely due to the patients; 29 per cent. had been under the observation of a physician from two to ten months, and in 12 per cent. the physicians who attended them had not made a pelvic examination. Of 112 women whom the writer personally examined no less than 106 offered the "change of life" as one of the reasons why they had failed to consult a physician; but when we consider that in 16 cases their attending physicians offered the same interpretation, it would seem as if we needed first to direct our educational efforts to the medical profession. It would appear, also, under such conditions, to be an unnecessary refinement to state how the bleeding from uterine cancer, occurring in small amounts between the regular periods, often after intercourse or a douche, differs from the excessive menorrhagia so characteristic of uterine fibromyomata. Regarding the significance of atypical bleeding during the menopause, we have always considered it necessary

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to qualify our statements; but from the writer's experience it seems necessary to state that atypical bleeding is always a pathological sign and always demands a pelvic examination. A patient who was curetted two years ago for atypical bleeding by a competent specialist continued to bleed slightly and intermittently until recently two small fibroids were discovered and the cervix was found to be the site of an early cancer. Other and similar experiences have convinced the writer that in the final analysis the number of cases of atypical bleeding, in which a local lesion of some kind does not exist, are relatively few.

The most serious obstacle, perhaps, to the solution of the problem of uterine cancer relates to the failure of surgery to cure the disease in any considerable proportion of cases. Of the 112 patients who were personally questioned by the writer, 98 indicated that the dread of the operation was one of their reasons for not seeking competent medical advice earlier, which in numerous instances was found out to be not the fear of a primary mortality so much as was the fact that their information had led them to think that the operation would not effect a cure. An illustration of this attitude is afforded by the writer's experience with nurses who have suffered from uterine or mammary cancer. They delay seeking advice as long, if not longer, than other women, and one with a plainly operable tumor of the breast absolutely refused operation because she said she had never seen a case cured. The writer's record of 100 cases of uterine cancer who applied to the hospital after operations had been performed showed the following: There were only 17 in which operation had preceded their application at the hospital by one year or over; 39 applied within three months after operation, 23 within four to six months, making a total of 62 in whom the operation had been performed within six months prior to application. The histories of these patients, their general condition and the anatomy of their lesion upon admission clearly showed that the disease had steadily progressed since the operation, and in the majority of the cases that its progress was more rapid since than before the operation. In a few instances only had the

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operations been performed by well-known surgeons. The excuse may be offered that these operations were only expected to be palliative, but in none of these cases was such a purpose presented to either the patients or their friends, and in no case was any palliative result attained. In fact, in cancer of the uterine cervix the lesion after the operation in 9 cases out of 10 presents in the vaginal vault an ulceration which is fully as objectionable as the primary tumor. A fair conclusion from the review of these cases is that the failure of surgery was due to a misconception of the extent of the disease when the operations were undertaken. Operability of cancer is plainly based upon such a complexity of factors that our experience increasingly indicates that the study and treatment of cancer is an institutional problem, by means of which the personal factor is eliminated and the results will represent the combined efforts of skilled workers.

The introduction of radium has created a new situation in the field of cancer therapy, the primary results of which are already sufficiently satisfactory to make it desirable to acquaint both the profession and the public with the facts. Of 35 cases that had applied to the hospital within three months after the beginning of symptoms there were three in which the growth was obviously limited to the uterine tissues, and in all an apparently complete regression of the tumor resulted from the application of radium. A similar result occurred in 17 other cases in which the extrauterine tissues were involved to a moderate extent, and which the skilled surgeon would place in the class of border-line operability. In the remainder the extrauterine tissues were extensively involved, and in none was the regression complete. In about one-half of them, however, the improvement was sufficient to be appreciated by both the physician and patient. In 34 cases that applied within four to six months after the beginning of symptoms there were none in which the growth was plainly limited to the uterus, but in three the extrauterine involvement was slight, and in all the use of radium produced an apparently complete regression. In 21 cases in which the extrauterine involvement was plainly beyond the field of operability the general improvement was

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marked, and the regression of the tumor, although not complete in any, was so marked that in a few there was slight evidence of the tumor two and three months after the treatment was applied. In the remainder the evidence of regression was so slight that it is questionable if the treatment was indicated. Compared with the primary results of surgery the results from the use of radium are undoubtedly better. Considering, therefore, the extent of the lesions as they present at the present time, radium is the method of choice, except in a few instances, in which the growth is in the early stage. In such cases, although radium in skilled hands and with the proper amount of radium, a primary and complete regression should be expected in every case, the time is too short to judge of the permanency of its results. In such cases, also, the possibility of lymph-node involvement, although not possessing the same relative importance that it does in mammary cancer, for example, must be seriously considered, thus making it unlikely that radium as a method of permanent cure will ever entirely displace surgery. There are a few cases, also, of the cauliflower type, in which a bulky, necrotic and bleeding tumor projects into the vagina. In these cases, for the prompt relief of the toxemia and anemia, the actual cautery seems to be occasionally the method of choice. There is, moreover, a number of cases, unfortunately too large, in which the extension of the lesion has obliterated the normal relations of the organs in which, not infrequently, the general condition still remains good. In many of such cases the use of radium is not only of no value, but it is harmful. Such cases must be recognized, else radium will soon be discredited in the same way that surgery is at present, because it is misapplied.

In conclusion the problem of the treatment of uterine cancer at the present time is largely palliative, for which radium, with few exceptions, is the method of choice.

If so taught to the profession and public, not only will our therapeutic results be immediately improved, but by eliminating the fear which misapplied surgery has produced an increase in the number of cases in the early stages may be expected.

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OPERATION OR RADIUM FOR OPERABLE CASES OF CERVICAL CANCER?

By William P. Graves, M.D.
Boston, Mass.

The question of whether to operate for operable cancer of the cervix is at the present moment offering to the science of gynecology a new and enlivening problem. Fortunately it is one that requires for its solution only sufficient time in which to secure an adequate comparison of final results between operated cases and those which under similar conditions have received radium treatment. At the present time such a comparison is necessarily imcomplete. In most clinics, like our own, for example, the radium treatment has been applied only to inoperable and border-line cases, and it is but recently that a certain few experienced surgeons have discarded operative measures entirely and are treating with radium cases that are frankly operable. The final solution of the problem must therefore await conclusive evidence from the work of these pioneers. We must also take into account the fact that radium in sufficient quantities to afford successful treatment for cancer of the cervix is possessed in only a few localities, and that even in the best equipped radium institutions the questions of dosage and technical methods of application are still very much in the experimental state. During the period required for a more general distribution of radium, and the development of technical knowledge in its use, it is incumbent on those who are seeing many cases of cancer of the cervix to view the problem of treatment from an unprejudiced standpoint and to con-

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tribute from their own experience whatever facts may be of general value.

The present paper is a personal accounting of stock, by one who with an average amount of operative experience, and possessed of a moderate quantity of radium, has had an opportunity of comparing, to some extent, the results of both methods of treatment.

In order to make as complete a review as possible I have combined the analysis of my own cases of cancer of the cervix with those of my associate, Dr. F. A. Pemberton, whose percentages in results, as far as they may be compared, have been almost identical with my own. Many of the details of the analysis I shall defer for another paper and shall here mention only those figures which are of special interest for the subject in hand. The list of cases comprises those seen and treated by Dr. Pemberton and myself at the Free Hospital for Women and in our respective private practices. The period of observation extends from the present time back to the date of my first radical operation for cervical cancer eleven years ago.

Our first inquiry in the analysis of these figures must be directed toward the question of the actual value of radical operative methods. Especially is this necessary in view of the rather scathing criticism to which the surgical operation of cervical cancer is at the present time being subjected by certain of the more progressive of the radium enthusiasts. Thus we are told that the radical operation is too difficult for practical use by the great body of surgeons and should be attempted by only a few skilled specialists. The disadvantages of the Wertheim operation are described in the following quotation from J. L. Ransohoff:

"In these days of low mortality percentages attending nearly all major operations no operation can possibly gain headway which combines with it a shockingly high mortality and large majority of distressing and desperate sequelæ. The effect on the lay mind must be taken into consideration, for while one may have over 50 per cent. of ultimate cures among those patients that survive the operation, the effect on the average

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intelligent citizen is abhorrent, if for this number of survivors there have been twenty-five deaths and for the other twenty-five a wretched existence attended by repulsive postoperative sequelæ followed by a painful and lingering death."

In fine, the operation is being condemned for its low percentage of operability and curability, its high immediate mortality and the large percentage of its postoperative sequelæ. To us these criticisms have seemed overdrawn and we have made this first statistical review of our cases with a particular interest in establishing the truth regarding these points.

Of first importance in any statistical report on the subject is the question of operability. The variation in operability percentages given by different surgeons is very great. In general, the figures in this country are lower than those from abroad, especially in Germany. Thus, Clark found only about 20 per cent. of his cases operable. Taussig gives 25 per cent. Jacobson in a review of the work of eighteen surgeons estimates a combined operability of 46.2 per cent. Wilson, in England, gives 32 per cent. Wertheim gives 50 per cent. Other higher figures are Berkeley, 63 per cent.; Aulhorn, 65 per cent.; Favre, 70.8 per cent.; Busse, in Krönig's Clinic, 78.9 per cent. It is to be regretted that some of the most prominent of American surgeons have omitted operability figures in their statistical reports.

In our work we have seen 181 cases, of which number 114 have been subjected to radical operation by the abdominal route. Subtracting 3 cases which refused operation, our operability percentage amounts to 64 per cent., a comparatively high figure.

The question of operability undoubtedly depends to a certain extent on the state of public education in a given community both with regard to the laity and the profession, and it is quite possible that this factor accounts to some extent for the higher rate of operable cases seen in the clinics of Germany where a systematic propaganda of public instruction in malignant disease has been carried on for many years. On the other hand in this country a very wide divergence in operability

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often appears in different clinics of the same community. We may therefore conclude that the estimate of operability depends to some extent on the individual judgment of the attending surgeon.

There is no doubt that the nature of the institution is an important factor in operability percentages. Thus in a large cancer institute a greater percentage of hopeless cases would probably be seen than in a smaller surgical hospital like the Free Hospital for Women.

In our choice of cases for radical treatment we have always been influenced by a firmly grounded conviction of the value of operation both as a curative and as a remedial measure, and it has been our policy to give to our cancer patients every possible chance either for a cure of the disease or for a reasonably comfortable prolongation of life. We have therefore made it a practice to operate on every case in which there is a fighting chance to remove the disease without killing the patient or causing permanent injury to the hollow organs of the pelvis.

The next important point in the consideration of the surgical treatment of cervical cancer is the matter of operative mortality. In our series of 114 cases there have been 6 deaths resulting from the operation, or 5.2 per cent. primary mortality. In view of the relatively high percentage of operability this mortality figure is satisfactorily low. As has been the case with other operators, most of the deaths were the result of unfamiliarity with the technic of the operation. Dr. Pemberton lost his first case, but has had no other deaths in his list of 19 operations. The other 5 deaths belong to the writer in his series of 95 operations. With the exception of one case of pulmonary embolism, in 1919, these deaths occurred during the period of surgical inexperience.

Our low mortality record we do not ascribe to any special operative skill but rather to the exercise of a certain amount of common-sense in the performance of the operations. In the great majority of our cases (99) the Wertheim technic has been employed, but after a few unhappy experiences we came to realize that in certain unfavorable cases the attempt to

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secure a wide dissection of the parametrial and paravaginal tissue is attended with too great danger of uncontrollable hemorrhage or permanent injury to the ureters or bladder to make it feasible. Under such conditions in several cases (15 in all) a short cut has been taken across the parametrium close to the cervix and vagina in the manner of a complete hysterectomy. The occasion for this more conservative method of extirpation has occurred when a dense unyielding parametrium has been encountered, the result of a long-standing parametritis or of a too drastic preoperative treatment with radium. In some cases it was employed in very fat patients, with inaccessible uteri fixed deep in the pelvis. Occasionally the Wertheim technic was carried out on one side of the pelvis and the short cut taken on the other. Special effort has been made to avoid sepsis and hemorrhage, the chief causes of immediate mortality. In the majority of our cases the cancerous mass has been curetted and cauterized a week or ten days before operation, during which time the vagina is treated with formalin applications. The reduction of the cervical mass greatly facilitates the dissection of the parametria, while the antiseptic treatment of the vagina reduces to a minimum the chances of infecting the peritoneal cavity during the vaginal amputation. For the control of hemorrhage we have not found it necessary to tie the internal iliac arteries but have pursued the "tie-as-you-go" principle. The method keeps the operative field clear of obstructing clamps and enables the operator at all times to be master of the situation. As a consequence postoperative shock has been an infrequent occurrence.

It has been our studied policy to avoid leaving the patient in a condition of worse suffering than she would have had without the operation. Thus in no case has there been an injury of the ureters and in only one case has there resulted a vesical fistula from injury to the bladder. One patient had a rectovaginal fistula, resulting from a gauze pack in the pelvis, inserted to control a difficult hemorrhage. Aside from these two cases the only fistulæ that we have had in our series have resulted from the overzealous prophylactic applications of

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radium following operation. In fact, we are able to state with considerable emphasis that in our experience the "wretched existence attended by repulsive postoperative sequelæ" described by Dr. Ransohoff is much more likely to result from radium treatment than from a radical operation performed with rational conservatism.

Of course, the supreme test that shall decide the choice of treatment must rest finally upon the question of permanent cure. It is customary to compute the end-results of the radical operation for cervical cancer on the basis of the so-called five-year curability test. Although we all know that a patient living and well and without palpable recurrence at the end of five years is not always permanently cured, nevertheless, for the sake of comparison, we must adopt this arbitrary time limit as our standard measure. In estimating the five-year curability in our operative cases we find that it amounts to a figure ranging between 27.6 per cent. and 34.2 per cent. according to the particular formula used in computation. This relative curability percentage compares sufficiently well with the figures of Jacobson, who gives a combined result of 23.4 per cent. for his eighteen American surgeons. It, however, is disappointingly small when contrasted with the figures of Wertheim with 42.5 per cent., Peterson with 47.3 per cent., and recently Cobb with 57.1 per cent. It is interesting to note that there are in this series 6 patients alive and well who have not quite completed the five-year period of curability. If this paper were to be written a few months later the proportion of relative curability would be distinctly improved. The following is an abstract of the full statistical report of our cases compiled by Dr. J. C. Janney.

Total cases seen, 181; refused operation, 3; cases operated on (Dr. Graves), 95 and (Dr. Pemberton) 19; total cases operated on, 114; operability, 64 per cent.; operative deaths, 6; operative mortality, 5.2 per cent.; relative curability (5 years), 27.6 to 34.2 per cent. (according to formula of computation); absolute curability, 16.8 to 18.5 per cent.

Type of operation: Wertheim, 99; complete hysterectomy, 15.

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We must now direct our attention to our results with the use of radium and inquire whether there has been in these results any justification for giving up the radical operation for operable cases.

Our earlier observations of the radium treatment were made in conjunction with the Huntington Hospital, at that time under the clinical direction of Dr. Thomas Ordway, and were later carried on at the Free Hospital for Women after the acquisition of 100 mg. of radium salts in the usual divided amounts. In addition to the treatment of inoperable cases an endeavor was made to employ radium as an adjuvant to radical surgery in operable cases. A number of border-line cases received intensive radiation and were then subjected to radical operation. Three of these consecutively operated on a few days after the last radium application developed an acute postoperative pelvic peritonitis from which 1 patient died. As these were the only instances of peritonitis in the series, and as all the conditions were similar in the 3 cases, it seems probable that the radium devitalized the normal tissues in some way so as to leave them non-resistant to infection. After this experience the operation was postponed for at least three or four weeks after the last radium treatment, as recommended by Wertheim. No more sepsis was encountered. In all of the cases, however, which had received several radium treatments the parametrium was sclerotic and devoid of the usual plains of cleavage. It was in cases of this kind, wherein it was found impossible, or at least inadvisable, to carry out the Wertheim technic of isolation of the ureters and wide dissection of the parametria. More recent experience has shown us that a single moderate dosage of radium does not sclerose the parametrial tissue and thus prevent the extended operation. In frankly operable cases, however, we are not convinced of the value of a preoperative treatment of radium.

A second method of using radium as an aid to the radical operation is its application as a prophylactic after operation. A number of cases were thus treated in the earlier experimental days of radium and an uncomfortably large percentage

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of them developed fistulæ after a lapse of several weeks or months. Here, again, there is no doubt that the radium was injudiciously applied, and that with a proper technic, most of these fistulæ might have been avoided. On the other hand, it must be granted that the short vaginal pouch left after a radical operation with its thin atrophic wall offers a feeble resistance to radiation and is susceptible to burns even when the radium is most skilfully applied.

We have therefore given up the prophylactic use of radium after radical operations in which a satisfactory extirpation of the disease has been attained. In other words, in a case favorable for operation we no longer use radium either before or after the operation.

On the other hand, when the specimen removed at operation shows that the extirpation has been incomplete, radium is applied as soon as the vaginal wound is healed. Three cases treated in this manner about a year ago have not yet shown palpable recurrence.

In the treatment of postoperative local recurrence we have found radium invaluable, though here again, in some of our earlier cases, we had trouble with fistulæ. In several instances the disease disappeared for astonishingly long periods of time, and in one case we think we have effected a cure. This patient was operated on in 1909 for well-advanced cancer of the cervix. She remained well for six years, when she had a local recurrence in the vagina, as proved by microscopic examination. Under radiation at the Huntington Hospital the recurrence promptly disappeared and the patient is now, five years after the radium treatment and eleven years after the radical operation, perfectly well.

In our treatment of inoperable cancer of the cervix we have had many brilliant temporary results and many disappointments. We have at present in our series a number of so-called "clinically cured" patients, but our previous experience does not warrant us in regarding any of these cases as permanently cured with the one exception mentioned above. It must be granted, however, that as our operability standard is excep-

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tionally high the cases assigned for radium treatment are necessarily of a rather hopeless type and that we have not given radium an entirely fair trial.

In the general review of our work it will be seen that we do not feel the same degree of discouragement with regard to operative treatment as is expressed by some surgeons in recent literature. On the other hand, radium in our hands, though it has been invaluable as a palliative, has proved disappointing as a curative agent, and we have not yet felt justified in substituting it for operation in a favorable case.

This conclusion, it must be repeated, is formed entirely from personal experience and does not accord fully with the views of some. Our next inquiry must therefore be whether our comparative failure in the use of radium is not due to inadequate methods of application rather than to any fault of the agent itself.

This question has been readily answered. I was fortunate enough to be present at the important radium conference held at the Memorial Hospital in March of this year and had the opportunity of seeing and examining many of Dr. Bailey's cervical cancer cases. It was entirely obvious to me that Dr. Bailey's results are far better than our own, both as regards palliation and permanent curability. This superiority in results must be ascribed to a greater knowledge and experience in the use of radium, to the possession of large quantities of radium element and to the elaborate and efficient technic of application. The conclusions from our personal results should therefore not be too greatly generalized.

Granting that cervical cancer is curable by radium, and that when properly applied in frankly operable cases, radium may be surer and safer than radical operation, a possibility that is by no means remote, are we then to give up the operation in favor of radium? The question must be answered according to the surgeon's individual facilities. In our own case, with a fair operative experience but inadequately equipped with radium and its necessary appurtenances, we are undoubtedly doing our best for our patients by continuing to operate on operable cases.

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AN ANALYSIS OF THE FAILURES IN RADIUM TREATMENT OF CERVICAL CANCER

By Frederick J. Taussig, M.D.
St. Louis, Mo.

The wonderful palliative results and considerable number of cures following the radium treatment of cervical cancer have been sufficiently established in the reports of various clinics in the last five years. In the future our efforts should be directed not to the narration of occasional successes but to the analysis of our still far too frequent failures with this method of treatment. Only by such a critical review of the technic and results of various methods of treatment can we hope to find measures that will bring our permanent results to a point in advance of those obtained by surgery.

My own experience dates back to November, 1917, when, following a stay of two weeks at the General Memorial Hospital in New York studying the technic and results of radium treatment at that institution, I began treatment of our cases at the Barnard Free Skin and Cancer Hospital (services of Dr. Gellhorn and myself). From that time to March 1 of this year I have treated 86 cases[1] of cervical and vaginal cancer and 6 cases of vulvar cancer, partly in combination with surgical measures. While it is of no special interest to give percentages on the basis of an experience of but two and one-half years the immediate results can be seen in the following table:

[1] Of this number, 21 cases were treated in private practice, and 5 were assigned to me at Barnes Hospital through the courtesy of Dr. Henry Schwarz.

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RESULTS OF RADIUM AND OPERATIVE TREATMENT OF 86 CASES OF CERVICAL AND VAGINAL CANCER. (NOVEMBER, 1917, TO MARCH, 1920.)

Total	Early operable 3		Advanced operable 6		Borderline 13		Inoperable 52		Advanced inoperable 12		Total 86	
	Radium	Operative	Radium	Operative	Radium	Operative	Radium	Operative	Radium	Operative	Radium	Operative
Number of cases .	1	2	0	6	6	7	52	0	12	0	71	15
Free of recurrence .	1	2	0	2	3	2	7	0	0	0	11	6
Recurrent . . .	0	0	0	1	0	2	11	0	0	0	11	3
Dead	0	0	0	2	3	3	29	0	11	0	43	5
Not traced . . .	0	0	0	1	0	0	5	0	1	0	6	1

All operative cases were given radium treatment either before or after hysterectomy or at both times.

These immediate results are far from inspiring, but this must in part be attributed to the fact that we sought in the first year and a half to include every case sent to our institution no matter how wretched the patient's condition. When one sees an occasional desperate case show marked improvement it is a great temptation to extend the indication for radium treatment to the utmost limits. We have, however, come to the same conclusion as Bailey, that the chance for doing harm is so much greater than for doing good that these women had better be given acetone treatment and opiates. Radium only leads to increased suffering.

There is still some argument as to whether roentgenologist or gynecologist is better qualified to give radium treatment in our special field. Personally, I believe that the difficulties of bimanual examination in these cases require the services of a trained gynecologist for correct interpretation of results. The roentgenologist, even with occasional examinations by a specialist, cannot properly keep track of results of treatment or be able to judge of suitable dosage. Nor does it follow that every gynecologist can or should become expert in this special field of work. We should make a distinction between the treatment of benign and malignant conditions. Every gynecologist should qualify himself to use radium in the treatment of fibroids and myopathic uterus. The necessary experience can be acquired

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quickly. Far different is it with the treatment of cancer. Here we have a problem whose complexity puzzles even those of us who have been working with radium for years. Offhand, I should say that the technic of the radical Wertheim operation for cervical cancer was simplicity itself, compared to the technic of radium treatment in this disease. To properly qualify for this work one should not only undertake preliminary studies by visiting for several weeks the large radium clinics in this country but have access to a considerable cancer material for continued study and treatment. Much also is to be gained by keeping in touch with the manner of treatment and results of radium treatment in cancer of other organs.

No matter how careful the preliminary training, however, mistakes are bound to be made. We must all to a degree learn in the school of experience. Perhaps the first and most general mistake is the attempt to extend too widely the limits of radium treatment. When one sees a perfectly hopeless case suddenly take a new lease on life, change from a bed-ridden morphin addict with large foul-smelling cervical crater to an apparently healthy woman, able to do all her work for a period lasting over years, it is no wonder enthusiasm overleaps its bounds. Such was the case in one of our patients whose record is worthy of special note.

Annie S., aged fifty-five years, entered the Barnard Free Skin and Cancer Hospital on May 2, 1917, with the diagnosis of inoperable carcinoma of the cervix. Six months previously she had been at the City Hospital, where the condition was considered inoperable and an excochleation was done December 8, 1916. Since this operation there had been continuous foul-smelling discharge and severe pains in the lower abdomen. Physical examination showed the posterior lip of cervix gone with induration posteriorly to the rectovaginal septum. Both parametria infiltrated to the pelvic wall. Rectally a hard mass projected into the lumen of the rectum with mucosa still intact. She was excochleated and cauterized on May 4, May 29, July 2, August 3 and September 6, 1917. This repeated cauterization treatment, in accordance with Lomer's suggestion, was associated with acetone treatment administered three times a week.

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Outside of diminished discharge there was no improvement. From September to November she was receiving 1½ grs. of morphin hypodermically a day. In November we began to receive radium emanations through the generosity of the General Memorial Hospital of New York for a short period of time, and on November 21 an application of 157 mc., filtered in ½ mm. German silver, was made within the crater. On December 17 another application of 217 mc. for nine hours was made with the same filtration in the same location. This totalled 3444 millicurie hours. There was marked retrogression within six weeks. On January 7, 1918, the pain was so much lessened that only an occasional dose of morphin had to be given. Considerable scar tissue was present in the pelvis, so that it was not until April, 1918, that it seemed certain that complete retrogression had occurred. The patient has reported for examination at intervals of three to six months since, feeling in perfect health and without any visible evidence of cancer. She gained twenty-five pounds in weight. The last examination was made February 24, 1920.

Such a case is but the exception that proves the rule, as our experience in twelve other far-advanced cases has lately demonstrated. In all of these women there was profound cachexia and involvement to the pelvic wall; in one case a rectovaginal fistula was already present. Every one of these women died within seven months of the time of their treatment, in two instances within four weeks. Occasional slight temporary improvement was noted, but in most of them pain was rendered worse, and fistulæ developed sooner.

Dosage. The question of dosage has been discussed in a somewhat slip-shod manner by many writers, who state merely the total mgrhs. without any detail as to filter, duration and interval of treatment, method of application, etc. I think the complete reports given by Janeway in all his publications have been distinctly worth while. Only by stating all essential points can we expect to evolve an improved technic of treatment. The very small doses using 50 mg. of radium for periods of twenty-four hours and the very large doses running up to 10,000 mghrs. intravaginally have been generally aban-

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doned. Doses are given ranging downward from Kehrer, 6000; Heyman, 5500; Bailey, 5000; Schmitz, 4500; to Schauta-Adler, 3500; Bumm, 3000; Seitz-Wintz, 3000; Menge, 2500; Janeway, 2500 to 3000; Burnam, 2000 to 8000 depending on extent of lesion. This dosage refers to the first treatment no matter whether scattered over several applications in the course of a month or given all at one time. In many instances some additional radiation will later on be required. But more and more the general feeling is that the first treatment is the crux of the matter; we either "make or break," depending upon our success at the time. There is not as much difference as one would think between the smaller doses of Janeway of 2500 and those of Heyman of 5500, for Heyman gave his treatment with a heavy filtration of 3 mm. lead in addition to 0.3 mm. silver, whereas Janeway imbedded bare emanation needles of low power up to 20 to 23 mc. in value into the tumor mass itself. Although in ordinary calculation the dosage of Heyman would be twice that of Janeway it is probable that the total radium rays absorbed by the tissues was greater in Janeway's form of treatment, including as it did the hard beta rays as well as all the gamma rays than in Heyman's, which permitted only a portion of the gamma rays to escape. This question of filtration is one of vital importance and one concerning which there is still considerable difference of opinion. If we wish to get superficial wound healing with but little primary local irritation there is no doubt in my mind that the very heavy filtration is to be preferred. But our problem is more complex than that. We want to produce deep destruction of cancer with least irritation of the normal tissue. The best filter for this purpose is the growth itself. Heavy filters are too bulky and are not needed for this work, since the cauterizing effect of the hard beta rays is here rather to be desired than otherwise. The use of heavily filtered rays intracervically has therefore only disadvantages. We must differentiate, however, between applications made within a cancerous crater, whose walls partly involve the remnants of the posterior vaginal fornix, and a real intracervical treatment. In the former case a heavy unfiltered

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dose may lead to profound rectal irritation and even a fistula, for the vaginal wall is sensitive to such beta rays. My own feeling in this matter is that heavy gamma radiation on the first treatment may not show any bad results at the time—may, in fact, be followed by marked retrogression—but that it has a greater tendency to produce fibrosis and obliterative endarteritis, so that when a second or third treatment is given the normal tissues are more liable to that profound necrosis which we all have learned to dread as the most serious complication of radium treatment.

As to the interval of treatment, I am more and more inclined to make this a matter of months than of weeks. Since practically without exception it takes at least six weeks for the tissues to show the full result of a heavy radium treatment, all applications within the first four weeks should be considered as one treatment. Thus Heyman, of Stockholm, whose results are in many ways very good, made three applications, the second one a week after the first, and the third at the end of four weeks, the total dosage being about 5500 mghrs. He calls this three treatments, but since the therapeutic effect was cumulative over a single period of eight weeks it should be more properly considered as one treatment. Thus far it would seem that the best results are obtained by attempting to effect a cure in the first treatment period. Occasionally one or two additional treatments are necessary, but when this is the case the prognosis is much worse. In fact, my own experience corresponds with that of Heyman and Janeway, who found that when, after apparently complete retrogression, the cancer again showed renewed growth, it could only in a small percentage be checked, no matter what treatment was given. In a large number of patients such added treatment actually did harm.

The question as to the point of application and manner of application also needs careful consideration. Intracervical applications are essential for success in the first treatment. I cannot agree with those who wish to melt away a cauliflower growth with radium, for this implies an intravaginal treatment and the vagina is far more sensitive to radium than the cervix.

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The mass should be scooped away in the usual manner with a spoon curette, at least sufficiently to leave a small crater or pocket in the cervix in which the radium can be deposited. Occasionally in flat, hard growths the radium, divided into several capsules or emanation tubes, can be placed close against the growth by means of a dental compound applicator or paraffin-coated lead mold. In all cases, however, either a needle or a small ½ mm. silver capsule should be placed high up in the cervical canal so that it lies in part above the apparent extent of the growth and shoots its rays from above downward. As to the use of the Bailey bomb method I think its preëminent value consists in its attack on the parametrium. I see only disadvantage in its effect upon the cervix itself, for the closer the applicator in this case the better the effect, and the bomb cannot get as close as other forms of applicators. I take it that a well-directed cervical or cervicovaginal treatment of 2500 mghrs. will in most instances annihilate the cancerous deposits in that first group of lymph nodes lying close to the ureter, but farther out in the parametrium we need a more penetrating dose. For this purpose the bomb with its heavy dosage for a short period of time, its distance of 1 to 1½ cm. from the vaginal wall and its sheltering filter from all sides except the point aimed at is the ideal applicator. I only wish we might possess sufficient emanation to utilize it. In the meantime massive roentgen ray can serve as a fairly good substitute in all except the very fat women. Rectal applications to effect the parametrium have been unsatisfactory in my hands. In the eight cases in which I have employed them the irritation produced has been intense, no matter how heavy the filter, with very slight effect on the tumor itself. In the diffuse infiltrations of the vesicovaginal septum, distance applications, well filtered, as suggested by Burnam have given good results. In vaginal cancers of the flat infiltrating type the use of Janeway's dental compound mold is a great help in accuracy and closeness of application. It is of great importance, as Kelly and Burnam state, to have the patient assume the knee-chest position for the radium applications, at least when there is no

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absolute fixation of uterus. In this position the cervix falls away from the rectum and by a properly placed gauze pack, in addition to a lead or gold filter, the very painful rectal tenesmus following radium treatment can be reduced to a minimum.

To summarize my technic, then, I should advise in cervical cancer of the inoperable stage an intracervical application of 125 mg., 25 to 50 mg. of which in the form of a steel needle or ½ mm. silver capsule is placed high up the cervical canal and the remaining 75 to 100 in silver capsules packed against the cervical ulcer in accordance with its size and shape. The vagina and rectum protected by a paraffin-covered lead shield 2 to 3 mm. thick and gauze used to immobilize the application. The application should last for 20 to 22 hours, a total of 2500 to 2750 mghrs. Three weeks later a massive roentgen ray over 6 to 8 portals should be given. The second treatment should be given only in case the retrogression is not complete after eight weeks have elapsed. Then a small dose of 1800 to 2000 mghrs. filtered with silver and 1 mm. of brass should usually be given as high as possible in the vaginal fornix. The cervix is usually obliterated at this time.

When emanations in large quantity are accessible the most logical method would seem to be the use of 20 mc. bare emanation tubes buried in the cervix, a total dosage of 2640 mchrs. when fully absorbed in about 3 or 4 weeks. At the same time a well-filtered application of 1000 mchrs. in the Bailey bomb is made for one hour to each parametrium and either roentgen-ray or radium abdominally and sacrally. The use of emanations in this way may give somewhat better results, but the many cures reported by Clark, Ransohoff, Bumm, Flatau and others sufficiently disprove Bailey's statement that the possessor of 100 to 200 mg. of radium had better content himself with mere palliative measures in the treatment of cancer.

Among the serious sequelæ of radium treatment, septic infection demands first consideration. Curtis recently reported a case of this sort, and we have probably all seen varying degrees of pelvic peritonitis following radium treatment. Such

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infections would seem to be rather the result of the radium reaction upon a previously infected uterus or tube than an infection due to the introduction of the radium itself. We also see frequent infections of the urinary tract. In fact, the so-called "radium fever" coming on between the third and seventh day after application is usually due to this cause. When the fever persists I have often found a pyelitis the responsible factor. In one such case all pelvic pains and fever were promptly relieved after catheterization of the ureters with instillation of silver solution.

Severe hemorrhage occurred in 8 cases as a result of radium necrosis affecting a branch of the uterine artery. In all of these cases a gauze pack was required to control the bleeding. The bleeding was much more profuse than in the untreated cancer cases, but since such blood loss occurred only once or twice at long intervals the resulting anemia was not as severe as in the untreated cancers with continued dribbling of blood for months.

Most annoying of all radium complications are the fistulæ, more especially the rectovaginal ones. Clark at last year's meeting of this Society stated that in his experience radium treatment actually decreased the frequency of vesicovaginal and rectovaginal fistulæ in unrestricted carcinoma of the cervix. I think a closer analysis would have shown that while radium probably to a degree decreased the frequency of vesicovaginal fistulæ, it at the same time increased the number of rectovaginal ones. The reason of this probably lies in the greater proximity of the cervix to the bladder and its markedly favorable reaction to radium treatment as compared with the vagina. Before we began radium treatment at the Skin and Cancer Hospital we saw in the far-advanced cases about five vesical fistulæ to one rectal fistula. After radium treatment was begun the proportion was almost inverted. In our group of 86 cases, 9 developed rectovaginal fistulæ, and in 2 there was in addition a vesicovaginal fistula. I am excluding from this number 3 cases in which a urinary fistula followed as a result of hysterectomy. In analyzing the rectovaginal cases

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I found that only in one instance did the fistula follow a lightly filtered treatment; twice the fistula appeared in cases that had received both light and heavy filtered treatments, and in the remaining 6 instances the fistulæ appeared in cases in which the treatments were all heavily filtered. In 2 of these 9 cases only 1 or 2 radium applications were made, and in both of these the fistula did not appear until four months or after the last application, and just previous to the death of the patient. These fistulæ were therefore probably primarily due to the disease itself. In the remaining 7 cases from three to five treatments, heavily filtered at intervals of 2 to 4 months, were given. It is this repeated gamma radiation, even in moderate dosage, that leads so often to this complication. Another harmful factor that Weibel has justly emphasized is the combination of previous hysterectomy and radium. Weibel found marked rectal tenesmus and occasional fistulæ following prophylactic vaginal radiation after hysterectomy, and hence advised against it. One of my rectovaginal fistulæ developed after a second radium application following hysterectomy. Doubtless the diminished blood supply of the vagina after hysterectomy renders it more liable to radium necrosis.

In some of the cases with marked rectal tenesmus and stricture formation, the fistula comes rather as a relief than otherwise. Both Burnam and Bailey have noted this point and found temporary improvement following the breaking through of the rectovaginal wall. With this in view, and having had similar experiences, I recently did a colostomy on a patient whose rectum was almost occluded by fibrous infiltration. Considerable improvement was noted following this procedure, and I think it is worthy of further trial in these troublesome cases.

VAGINAL AND VULVAR CANCER. Six primary vaginal cancers and six vulvar cancers were treated with radium. Only one of the vaginal cases is free from recurrence, three are dead, one recurrent and one not traced. In the vaginal cancers, however, the result of operation in even the very earliest cases is so bad that radium is rightly to be preferred. Carcinoma of the vulva, on the other hand, is most unsuited for radium

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treatment. The radium reaction on account of the free nerve supply in this region produces severe and prolonged burning and pain. The local retrogressions are slow and incomplete and the glandular metastases, which occur so uniformly in this form of cancer, seem to appear earlier and grow more rapidly when radium has been used. Only 1 of our 6 cases is at present alive, and in that case excision of the vulva and tributary glands was combined with the use of radium. Unquestionably surgical measures will give the better results, although an occasional cure, such as Janeway has reported, may possibly occur when radium alone is used.

Primary cancer of the body of the uterus, if operable, we have always treated with hysterectomy in preference to radium. In one of our inoperable radium cases it seemed possible that the tumor sprang from the uterine body, though the cervix was also involved. No improvement was noted in this patient.

Operative Cases. Operation in the form of a more or less radical hysterectomy was associated with radium treatment in 15 cases of our series. In 7 of them a typical Wertheim operation was done, followed by a prophylactic radium treatment. Three of these 7 had a recurrence in the following year that required additional radium treatment. In 3 other cases the cancer was found to be too extensive to permit of a complete Wertheim operation. The remaining 5 were border-line cases rendered operable by rapid retrogression following radium treatment. There was no operative mortality in this series of 15 cases. Of special interest are the findings in the five uteri that were removed after partial or apparently complete retrogression following radiation. In 4 of them about 1 to 3 c.c. of cancerous tumor tissue were still present within the cervix. These cases had received a dosage of 2200, 2400, 2200 and 3200 mghrs. respectively from 1 to 4 months before hysterectomy. In the fifth case a dose of 2520 mghrs. was given intracervically. Although in this case the cancer was completely eradicated from the uterus an enlarged iliac lymph node removed at operation showed malignant involvement.

My experience with early operable cancer of the cervix treated only with radium is limited to one case that remains

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clinically cured for a period of twenty-two months. The contraindication to operation in this case was a high blood-pressure, nephritis and obesity. The arguments of Janeway, Ransohoff and Flatau in favor of radium in all of these early cases do not appeal to me. The two first named talk of an operative mortality of 20 to 25 per cent. following the Wertheim operation, but leave out of count entirely that this is not the mortality when the operation is limited to early cases. Kelly did not lose a case in 20 such early cancers removed by operation. In my own series there was no mortality. At the most a mortality of 5 per cent. could be held against radical operation in the early operative group. The proportion of complications and fistulæ would also be greatly reduced under these limitations. Bumm's statistics are most impressive. He reported in January, 1919, that out of 77 operable cases of cancer of the cervix treated in 1913 and 1914 with radium, 17 remained cured for five years, whereas out of 203 similar cases operated between 1911 to 1913, 77 remained cured in 1919, making a proportion of 22 per cent. cured with radium and 37 per cent. cured by operation. While both these percentages are higher than those obtained in other clinics they tend to show that under similar conditions operation is still attended with a greater likelihood of permanent relief in the early cases. Until an improved technic of radium treatment has changed this proportion of favorable results I think we should be very cautious in recommending the use of radium in early operable cancer of the cervix.

I am, however, inclined to share Bailey's views against operative removal of the uterus when radium has produced sufficient retrogression to make such a procedure possible. Out of my 5 cases, 2 are already dead, 1 has cancer in the glands and 2 are for the present free from recurrence. Even in the absence of any operative mortality not enough is gained to justify such a procedure. With Kelly I now believe we should limit our operative work to the evidently favorable group of early cases.

SUMMARY. 1. Radium treatment of uterine cancer should be kept in the hands of the gynecologist rather than the roent-

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genologist, but such a gynecologist should seek preliminary training in the use of radium and must have continued opportunity for observation and treatment of cancer cases in order to reduce mistakes to a minimum.

2. Good permanent results can be obtained in a certain proportion of cervical cancers with amounts of radium not exceeding 100 to 150 mg. of the element, though the use of large amounts in the form of emanation will doubtless decrease complications and increase the number of cures to some degree.

3. If possible all necessary treatment should be given within the first 6 to 8 weeks' period before sclerosis has set in and rendered the cancer less accessible and the normal tissues more susceptible to injury.

4. Tumor-filtration or light metal filtration together with intracervical application does most good and least damage; 2500 to 3500 mghrs. are usually enough to give results in the favorable cases.

5. In the absence of the Bailey bomb and large amounts of emanation, well-directed and prolonged roentgen ray from 6 to 8 portals will usually affect the parametrial and glandular involvements.

6. Prolonged necrosis and fistulæ are due to repeated treatments, to vaginal applications and to heavy gamma radiation or to a combination of the three.

7. Rectovaginal fistulæ are more frequent and vesicovaginal fistulae less frequent after radium treatment.

8. Operation is to be preferred in all operable cases under thirty-five years and in the early operable cases beyond this age. Radium is to be recommended whenever obesity, lung, heart or kidney lesion makes operation difficult or dangerous, and in advanced operable, border-line and inoperable cases, but not in the advanced inoperable group with cachexia.

These are, of course, not conclusions, but merely estimates based upon an analysis of the results thus far obtained. Under improved methods of treatment and wider experience they will doubtless be materially changed.

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DISCUSSION ON THE PAPERS OF DRS. WILLIAM S. STONE, WILLIAM P. GRAVES AND FREDERICK J. TAUSSIG

DR. JOHN G. CLARK, Philadelphia.—In all discussions concerning cancer therapeusis, we are invariably impressed with the very small number of cases which reach the surgeon in time for a cure of the local condition, and this will continue to be the cause of the great hiatus between the large mortality series and the relatively small number of cures. Since we have employed radium in the University Hospital, this fact has been tragically thrust upon us, for in cancer of the cervix at least 5 cases are quite hopeless so far as an operation or even radiation is concerned when we first see them to one which has a reasonable prospect for cure. In a series of 94 inoperable cases treated in 1914, 1915 and 1916, 20 cases are living and free from progressive or recurrent symptoms. This showing is, of course, a highly gratifying one when considered in the light of extensive cautery and other escharotic methods of treatment hitherto in vogue, but it impresses the tragic truth again upon us that the age-long search for a reasonably sure cure is still among the riddles of our medical universe. Among our list of twenty survivors there are several cases which fly in the face of all preconceived theories, for a few of these most brilliant cures were of the worst possible outlook. It must be our function as specialists to weigh and judge methods best suited to all classes of surgeons, for I daresay the highly skilled gynecologists of our country really see but a minimum percentage of all cases subjected to treatment. Is the radical operation with its high mortality percentage and considerable degree of morbidity to hold first place, or shall we turn to radium, as, upon the whole, the safer, and in the end, the better road for the general surgical world? Upon this question none of us may yet rest a decisive answer, for we are not in a position to positively judge of the ultimate effects of radium. Such excellent statistics as those presented by Dr. Graves speak tellingly in behalf of the radical operation in skilled hands, but they will not stand the test when worked into the daily routine of the many general surgeons of this country with a meager opportunity for perfecting a technic for many may not operate upon 10 cases in a year. For this reason, I have found in my

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own experience, as I have witnessed, the beneficial results of radium that my indications for a radical operation have diminished until they have reached almost the vanishing point. The immediate dangers and complications of the radical operation are many; those of radium are almost of negative proportions. Radium has had to bear the odium of producing fistulæ, but we are in a position to refute this assertion, for in our large series only 17 such complications have arisen. Instead of provoking these fistulæ, I am confident they are in a large aggregate of cases prevented even in the large number of cases in which radiation only has a palliative value. In many cases of our series deep craters and sloughing areas have locally healed, but the patient ultimately perished from deep recurrences or metastatic growths. In such cases, the abrogation of the destructive process in direct contact with the bladder and rectum have actually saved the day so far as these deplorable events are concerned.

As to the postoperative use of radium, I am positive that nothing will be gained by a waiting policy of weeks after the initial radiation, but I am inclined to put into effect the suggestion of Dr. Howard Taylor, who makes his application a few days before the operation. This suggestion is certainly worthy of proof. In any event, the vaginal vault should be radiated two or three weeks after the operation.

Dr. Taussig raises the question of the difficulties of application. Upon this point, I feel that we have gained a great vantage point in discarding metal shields, such as gold, lead, etc., and employing gauze packing for the purpose of giving a safe distance of healthy tissues from the radiated surface. Since we have adopted this plan of leaving a wider separation of the rectum and bladder from the cervical involvement, we have had much less proctitis and have reduced the formation of fistula to almost a negative figure. My associate, Dr. Anspach, and I have recently discussed the possibility of too repeated applications, for some of our brilliant results have occurred in women who refused to undergo a second application and yet have had no local recurrence. In other instances, we have seen ugly breaks in tissues, which were apparently healed, by repeated applications.

We have had a very large mortality rate within three to six months after radiation, an experience duplicated in all operative

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procedures. The query, therefore, arises, is it best to attempt treatment in the very far advanced cases? Certainly when the cervix has vanished and in its place there is a deep crater involving the rectal and vesical walls nothing will be gained and we are now following a limited exclusion policy in such cases. The palliative value is negative and the harmful possibilities positive in some of these cases, hence we advise patients in advanced stages to return home without treatment, for many of those wretched individuals are almost moribund when they are admitted to the hospital or when we see them in consultation.

DR. ARTHUR H. CURTIS, Chicago.—Of all cases seen up to five years ago, namely, 79, the relative curability was 34 per cent. of 48 cases operated on.

DR. CURTIS F. BURNAM, Baltimore.—Dr. Stone's paper is interesting and timely. Radium, with its intriguing possibilities, has turned us toward a much more thorough study of cancer of the cervix. Before the age of radium, I was interested in cancer of the cervix only to the extent of making a diagnosis and determining whether it was operable or inoperable With radium the possibility of treating successfully, or helpfully at least, extends from the very incipiency of cervical cancer to the last stages. Each case presents a problem in itself. It is natural, therefore, that we are all greatly awakened in regard to the study of the progress, development and entire history of this diseases.

There are three general methods of applying radium: (1) The topical application to the cervix, which is possibly the only way necessary in early operable cases or, at least, in those operable cases where radium is employed instead of operation. (2) The burying of suitable emanation carrying points directly into the cervix and parametria and into the fixed masses on the pelvic wall which occur in inoperable cancers of the cervix. One can by this technic delay the disease, doing away with pain and in some cases curing, where topical applications yield no results. This method is also applicable in conjunction with operation in the treating of fixed gland metastases, particularly in the iliac groups. (3) Transabdominal treatment, such as Dr. Bailey and I have used for several years, is a valuable adjunct in the extensive cases and permits of a formal and much more radical

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technic than that afforded by the topical application alone. To carry this out, however, a distance of at least 10 cm from the skin must be used, many skin portals and a large amount of radium, and plenty of time must be available.

Dr. Graves has presented wonderful results—better than we have had in Baltimore and, in many respects, better than most of those which have been published. I wish to congratulate him. I am sorry that neither he, Dr. Taussig nor Dr. Stone considered the different types of cervical cancer and the results from treating these different groups. It is not enough to recognize that there is an adenocarcinoma of the cervix or a squamous-cell epithelioma, but it is important to bear in mind that there is a typical basal-cell epithelioma of the cervix, which is common, which responds to radium admirably and which is not so likely to produce metastases. There is no danger nor is there any difficulty in doing a hysterectomy two or three days after a preliminary radiation, such as one would carry out in an operable case where the two methods are combined. Neither we, personally, nor our colleagues in Baltimore have lost a patient in this way.

Through the interest and courtesy of our confrères in Baltimore, as well as outside the city, we have been able to collaborate in operative and radiation technics. My impression is that it is much better to radiate before operation, and that it can be done more efficaciously.

There is no excuse whatever for vesical or rectal fistulæ in operable or early inoperable cancers of the cervix after radium treatment. Where there is an enormously extensive growth, and where it is widespread over the vaginal walls, such a comlication is sometimes unavoidable. It should be remembered, however, that it is better to have a fistula as this may be repaired later than to die of cancer.

I want to emphasize my feeling that the members of the American Gynecological Society should stand together and should develop some standard method of recording the clinical findings in cases of cervical cancer. When I began using radium I did not appreciate the importance of the rectal examination, nor did I know that a stricture of the ureter was a contraindication to operative cure. Every patient ought to be carefully examined and, so far as is possible, the exact extent of the growth determined and recorded before any treatment is carried

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out. A small cancer of the cervix with a movable uterus which shows two or three isolated nodules in the vaginal wall is inoperable. It might seem a very easily operable case if hasty or incomplete examination were made. With radium the treatment of such a case has a very different prognosis from the inoperable case due to extensive infiltration and fixation through the parametria. It seems to me, too, that the combination of radium and operation might be employed with advantage in the squamous-cell cancers of the cervix, where the radium is capable of taking care of the local lesions, but where there are regional gland metastases and where a thorough cleaning out of the regional glands operatively might be done in exactly the same way that we do in lip and breast surgery. I mean a radical Wertheim removal plus a thorough gland removal has proved to be too great a surgical undertaking and too fraught with a high mortality to be systematically carried out. I feel that it is a great mistake to discard our operative measures. I think the wisest course to pursue is to analyze our operable cases after separating them into three or four groups; some should have operation alone, some should be radiated alone, and some should have the combined treatment.

We, Dr. Kelly and I, have had 34 cases—all of whom were inoperable or extensive borderline cases and all of whom are well now, five years after radium treatment. I feel, therefore, that it is possible to permanently cure with radium; but it is undeniable that certain types of growth are very resistent to radium destruction and yet are curable by radical removal, provided they are not too far advanced. This we know positively to be the case in lip and skin cancers and it seems likely that it would be so in cancer of the cervix uteri.

Dr. C. Jeff Miller, New Orleans, Louisiana.—After an experience covering a period of six years, and comprising 104 cases of cancer of the uterus, I am thoroughly convinced that radium is the most valuable adjunct to surgery so far suggested. It has been unfortunate that so much discussion has been indulged in regarding radium versus surgery. No one, except the earlier enthusiasts, has claimed that radium would supplant surgery, and now that we have abundant clinical data, it is possible to determine the indications and limitations of radium, as we have previously done with radical hysterectomy.

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From the statistics now available, I believe the following deductions will be acceptable to the majority of those using radium. In early cancer of the uterus, surgery is unquestionably indicated. It is possible that it may be eventually shown that the results of radium in the early stage, may equal those of surgery, but until this is known, we should insist upon operation. In regard to the borderline cases, we may just as positively insist that radium yields as good or better results than surgery.

In this group we feel that we have made distinct progress, for the operative results have never been satisfactory in eradicating this disease, and in addition they often furnished a train of postoperative sequelæ that added to the burdens of the patient. I am confident that a large series of cases in this group will show better end-results, than the same number treated by surgical intervention.

In advanced cases there is no longer any question but that radium accomplishes more than any other therapeutic agent. We have learned, however, that material from this group must be selected with some care. Fistulæ are so prone to follow radiation in cases presenting an advanced stage of ulceration that it is occasionally wise to advise against radium. Originally, we had hoped to increase the operability of advanced cancer by first using radium and operating after the process had been controlled. This hope has been dispelled by the unsurmountable difficulties encountered in dissecting the pelvic structures after radiation. Some authorities still advocate operation in occasional cases, but on the whole I believe that once radiation has been undertaken, it should be continued without operation. Incidentally, it may be added here, that curettage and cautery in advanced cancer, preliminary to the use of radium, do not enhance the results of the treatment, and carry with them some objections.

We have not been able, as yet, to prove that the preliminary use of radium before operation in early cases, has any distinct advantage. It has a rational basis, however, and if operation is undertaken within ten days after radiation, no complications should be anticipated, and many cells, overlooked during the operation, may thereby be affected.

I am not certain that we have proved the value of postoperative radiation, although I recommend it. A few observers have studied parallel series, and proved to their satisfaction

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that recurrence was retarded, but such observations necessarily require a long period of time, and a large amount of material to definitely settle this point. Since we are gradually formulating clinical rules in regard to the use of radium, it is to be hoped that something can soon be authoritatively offered regarding the dosage. So far, this is still confusing, and capable surgeons and small institutions, who might purchase an amount that would place radium in a community, hesitate when one authority uses a gram, while another is using 50 mg.

The clinical results, at present available, do not know such a marked difference between the cases treated by massive dosage, and those treated properly with 100 mg, as to discourage the surgeon who has a limited supply.

We have all had experience with proctitis following the use of radium; and just why it is that the rectum does not tolerate radiation as well as the bladder is not known, but every precaution should be taken to prevent it. In cases, presenting rectal involvement, especially if symptoms of partial obstruction are present, a preliminary colostomy may be considered. I have resorted to this in several instances, and later applied radium freely to the vaginal vault and in the bowel, without causing annoyance. This is a point that should be emphasized, for not a single case complained of tenesmus.

My experience with vulval cancer is practically the same as that related by Dr. Taussig. They do not respond as does uterine cancer, and my results have been disappointing. I had hoped that Dr. Burnam would have something to say regarding his results in this group.

Altogether we have distinctly advanced the status of the treatment of cancer by this valuable adjunct. We have alleviated pain, controlled infection, and prolonged life in the hopeless cases; eliminated a large group from the surgical list, and frequently permanently cured cases in every group that were not amenable to surgical intervention.

Dr. Harold C. Bailey, New York City.—I think Dr. Graves' paper was very timely because it shows us that we still have more than one method of dealing with these cases of cancer. He is to be complimented on his statistics, especially with regard to early operative mortality. I take issue with him, as did Dr. Clark, on the preoperative or postoperative treat-

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ment. These are two problems that have to be worked out. The amount and time for the preoperative treatment must be definitely determined, and I think if the preoperative treatment is given, further postoperative treatment will have to be very mild. We have in the postoperative treatment great advantages. Here we have masses of radium. Of course the parametrium is pretty thoroughly radiated.

Dr. Burnam brought up the question of the type of growth and this we must definitely understand. The columnar and basal cell type acts differently from the squamous cell. There is also a particular resistance or immunity of these individual patients to the radium.

With regard to the control of dosage, we have now developed a method of measuring dosage, by the skin dose, so accurately, that we can tell exactly how many centimeters into the parametrium the dose is delivered from within the uterus and vagina. At 10 cm. such a skin dose is delivered using this term as a unit. Some of these bad cases do not respond to radium used on the limit of a skin dose, and some of these treated in the routine way who unexpectedly have openings in the rectum, we find have a low skin dose.

Dr. Lewis S. McMurtry, Louisville, Kentucky.—I would like to ask those who have read papers and have had a large experience in the use of radium to tell us whether or not the effect of radium is uniform. I would like to know whether or not there are some cases that present themselves clinically and look to be perfectly suited for radium treatment, that do not respond, and whether the effect of radium is uniform in those cases.

Dr. Gustav Kolischer, Chicago (by invitation).—Any organ of the body exposed to the rays develops a system of its own, consequently radiation depends not on the source of the rays entirely but on the character of the substance interposed, consequently it is not only the dimensions of the filter we have to consider, but the material out of which the filter is made. This accounts for the destructive action of the radium in parts of the body far remote from the radium source. For instance, a heavy zinc filter or glass filter will lead to a remote destructive

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action, while the use of a filter reënforced with chamois, as suggested by Clark and Pfahler, of Philadelphia, will prevent this damage.

Another point is this: It is said that all the curative actions of radium, if there are any, are due to the direct action of radium on the cells of the tumor. I hardly think that is true. If it were true, it would necessarily follow that radium will influence favorably any malignant tumor that is exposed, but unfortunately that is not so. Only the minority of tumors can be influenced by radium and the *x*-rays. Furthermore, those who have theorized a good deal on this subject have failed to explain how a tumor will grow materially under the influence of radium, although a large quantity of radium was applied.

Again, if you take, for instance, a case of lymphosarcoma that will yield to treatment at all, it is unnecessary to expose the whole surface or the interior of the tumor. If such a tumor yields at all, you can see the curative effect before you expose a small part of the tumor. The same holds true with reference to parenchymatous goiters.

Dr. Reuben Peterson, Ann Arbor, Michigan.—In this important discussion we should not forget the first paper read by Dr. Stone. The propaganda, so far as cancer in Michigan is concerned, may be said to have failed for cancer of the cervix. We have been endeavoring for the last ten or fifteen years to aid in the propaganda for cancer, but I cannot say that the operability is any better today than it was at that time. Therefore, there is something Dr. Stone has brought forward which we ought to consider, that is, whether we have not been dwelling too much upon the cure of cancer by operation. If people are urged to take advantage of radium, we may get more women to come to us at a time when either radium or operation can be used to advantage. I fear, however, unless Dr. Stone and other men who are using radium are honest with the people, the same thing will happen as occurred in the operative treatment of cancer. All the patients undergoing the radium treatment will think they are going to be cured and in the popular mind the treatment will fall into disrepute when only a comparatively small number are cured.

I was delighted with Dr. Graves' results. He has not very definitely told us how the percentages were arrived at. In spite

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of his explanation, I am free to confess I do not know what he means by 34.2 per cent. or 19.1 per cent.

So far as the figures are concerned, I cannot discuss his results, but I do know that he has had a very low mortality, and if combined with that low mortality of 5.2 per cent. he can show at the end of five years a large number of patients living and well, he is to be congratulated on his results.

I have never used radium in cases of cancer of the cervix; my work on such cases has been entirely operative.

I think what Dr. Burnam has said is perfectly true, that we are not scientific so far as our definition of what kind of cases we are operating upon or treating by radium. Until cases of cancer are standardized the whole thing is bound to be in a state of confusion, so standardization should come as soon as possible.

When we turn to Dr. Taussig's paper and the chart he showed and the results, the outlook is not hopeful so far as combining radium with the operative treatment. We must perforce pay attention to the conclusions of men who have had such large experience with radium as Drs. Clark, Burnam and Miller, and it will undoubtedly lead those of us who have no radium, but who have had simply operative experience with cancer, to consider whether it is not our duty to take up this treatment by radium.

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LUTEIN CYSTS ACCOMPANYING HYDATIFORM MOLE

By W. A. Coventry, M.D.
Duluth, Minn.
(By Invitation)

Introduction. The good fortune to have observed two cases of large bilateral multilocular lutein cysts accompanying hydatiform mole prompted a review of the text-books and other literature at my command and brought to my attention that these cases are comparatively rare, and they seem to me to be of sufficient importance to warrant reporting. The bulk of the literature relating to conditions of this kind is given to a discussion as to the cause and relationship of mole and chorio-epithelioma and very little to this condition of large bilateral multilocular cysts, which in a very small proportion of cases seems to accompany only mole or its related disease, chorio-epithelioma. Previous to 1905 the literature, although reporting similar cases, does not go into detail nor attempt any explanation as to the possible cause or formation of these cysts, whether of the large, fast-growing type or of the ordinary corpus luteum cysts.

In 1905 Patellani reported 68 cases of chorioma in which bilateral cystic changes in the ovaries occurred in 62 cases, or 91 per cent. However, his record does not attempt to show, as far as I am able to ascertain, whether these cystic changes in the ovary were of the large multilocular type similar to those found by myself.

Findley reports only 58 cases out of the 500 cases of chorioma and mole that he was able to review. What per-

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centage of them were of the pathologic type of cyst I am not able to ascertain.

Paul Bar reports one case of large bilateral corpus luteum cyst accompanying chorioma, and says he believes that when this combination occurs one should do a hysterectomy, and he also thinks that these ovarian cysts continue to develop after removal of mole.

Schwartz reports a case accompanying chorioepithelioma, and his description of these tumors corresponds very much in detail to those seen by myself.

Wallert, in 1908, collected several cases of pregnancy in which he found cysts almost as large as he found in a certain case of chorioma, but he neglected to state how large these cysts were, and therefore his observation, as far as the report is concerned, is not of much value.

ETIOLOGY. Stoeckel, in 1901, showed that many of these cysts are developed from the corpus luteum and are accompanied by a more or less diffuse infiltration of the ovary with lutein cells, from which multiple cysts probably arise. However, he was not able to definitely prove his case.

Seitz, in 1906, gave us our best interpretation as to the cause of these cysts, when he said that the origin of the cyst could be attributed to the atresic follicles of the ovary, and attempted to prove that the hyperplasia of these follicles is quite different from those of a true corpus luteum. Thus, he drew a distinction between cysts of the true corpus luteum and the polycystic conditions found in mole and chorioma. He also attributed the great size of these cysts to some mechanical factor, as a venous congestion from adhesions, chronic nephritis, etc.

Ewing, commenting on Seitz's observation, says, "The chief origin of the multiple cysts may be from the atresic follicles." Seitz's argument that the condition in the ovaries in chorioma or mole has no other significance than that of a slightly exaggerated normal process is plainly defective. The astonishing grade of cystic degeneration common with mole is not duplicated in any other condition, and mechanical factors cannot

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be held responsible for this change," and also adds that "In view of all facts and the occurrence of peculiar bilateral cysts of the ovaries in at least 91 per cent. of cases of chorioma it is difficult to escape the conclusion that there is some essential relationship between chorioma, mole and these polycystic conditions of the ovaries."

HISTOLOGY. These cysts undoubtedly come under Class IV of Ewing's classification, in which he says they are cysts lined by lutein cells covered by cylindrical, cuboidal or flat epithelial cells. The walls of these cysts are very thin (almost translucent) and may contain a clear, limpid fluid, sometimes bloody and sometimes containing gelatinous clots.

Somewhere I have read that these cysts were probably retention cysts, with fluid coming from the secreting lutein cells, or possibly an exudate of serum from adjoining vessels.

Schwarz feels inclined to derive the lutein cells in his case from theca cells, and found in many places numerous islands of these cells scattered in the stroma, showing no signs of degeneration. On the other hand the cells lining the cyst cavities are undergoing retrogressive metamorphosis.

Schaller, Pfoerrinder and some others express their views that the lutein cystomas might be a carcinomatous degeneration of lutein cells. However, the rapid growth of these tumors is no sign of malignancy in the cells themselves. So far nobody has been able to find any evidence of malignancy in these tumors. Someone has suggested that the smaller cysts in the ovaries were probably preceded by hemorrhage into the follicle, which in some way leads to an excessive production of lutein tissues, and subsequently these cysts become distended by a secretion from the cells themselves.

Eden and Lockyear, in their text-books, are inclined to believe that these tumors come entirely from the theca cells of the ovaries.

CLINICAL HISTORIES.

CASE I.—Mrs. J. A. P., aged twenty-two years, para II, presented herself, October 3, 1916, with a history of having

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had a forceps delivery two years previously, which evidently had been a very hard one, as at that time the vulva had been torn loose from the pubes and the cervix and perineum badly lacerated. The last menstruation was June 12, 1916, about four months before she came under observation.

Examination at that time showed a patient who was extremely anemic, with a rather marked dilatation of the heart as a result. Vaginal examination showed her uterus enlarged to about a four months' period, freely movable, and did not cause much, if any, pain on motion. Abdominal examination, however, showed the presence of free fluid, and on both sides of the uterus could be felt abdominally large masses, which seemed to be cystic in nature. Examination of the chest was negative for tuberculosis.

The patient gave a history of bleeding for the last three months, and during the past week had had several uterine hemorrhages, but had not as yet passed any material from the uterus.

I made a diagnosis of tuberculous peritonitis complicating pregnancy.

Our decision was to operate the peritonitis and allow the patient to abort spontaneously, if at all. A median incision made above the umbilicus immediately disclosed a large amount of fluid, containing gelatinous clots. Further exploration revealed a very large multilocular cyst of each ovary with very distinct pedicles; there were no adhesions. The tumors were removed and the wound closed in the usual manner.

Postoperative examination of the tumors showed them to be made up of multiple cysts, each tumor being about the size of one's head. The cysts were translucent, and so exceedingly thin walled that when lying upon the tray the serum seemed to ooze through the walls. On section they contained a straw-colored material, which was slightly blood-tinged and contained some gelatinous clots. Nowhere could any evidence be found of tubercles.

The diagnosis was made of bilateral multilocular lutein cysts of the ovary.

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The following day the patient aborted a portion of a hydatiform mole of the characteristic consistency, shape and appearance. The patient was again anesthetized, the mole removed with forceps and the uterus packed with gauze, no curette being used.

Patient made an uneventful recovery and to this date is still living, there having been no evidence of chorioepithelioma developing.

CASE II.—This case differs somewhat from Case I in several clinical features. The patient came under observation three months later, in December, 1916; thirty-one years of age; para VII. The last menstruation had been two months previous to coming under my observation. The youngest child was ten months of age and she had nursed it for eight months. She had been flowing for two weeks. No particular pain and no brisk hemorrhage. Vomiting had persisted since the last menstruation. The urine gave a marked reaction for diacetic acid.

Her condition was treated for one of pregnancy with accidental hemorrhage, and two weeks later the patient was again examined. This time the uterus had enlarged from the size of a two months' pregnancy to that of practically one of five months. Diagnosis of mole was made and the mole was removed under anesthesia, with placental forceps but no curetting. Having in mind the previous case a painstaking search was made for possible cysts of the ovary but none could be found.

One month after the removal of the mole, the patient in the meantime having gone to another city on a visit, she presented herself for examination, which revealed the uterus to be rather enlarged and retroverted; but now, in the abdomen, could be felt two large tumors, each about the size of one's fist. They were fairly hard and did not feel cystic. However, in view of the previous case a diagnosis was made of bilateral cysts of the ovaries, with a possible chorioepithelioma developing. Operation was advised and accepted, and I found both ovaries slightly larger than my fists, containing multiple thin-

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walled cysts. No free fluid in the abdomen. The uterus was large and flabby, about the size of a two months' pregnancy. There were no apparent signs of chorioepithelioma, but having this in mind a hysterectomy was done, with removal of both ovarian tumors. The wound closed in the usual manner and the patient made an uneventful recovery, and to this date is strong and well, with no evidence of any recurrence.

Microscopic examination of the uterus, after very diligent search, showed no evidence of chorioepithelioma. Examination of the cysts showed the same character of cysts as found in the previous case, though they were not so large. The fluid contained was straw-colored and slightly bloody in appearance.

Postoperative Diagnosis: Double multilocular lutein cysts of the ovaries; subinvolution of the uterus.

Discussion. These two cases present several very interesting features:

1. The appearance of the ovarian tumors, in one case appearing with the mole (in fact, clouding somewhat the history of mole), and in the other case seeming to arise and starting to grow rapidly after the mole had been removed.

2. The gross and microscopic appearances of these cysts are in marked contrast to those of the ordinary type of ovarian cyst.

3. These multiple lutein cysts are beyond a doubt different from those normally appearing during pregnancy.

4. These lutein cysts undoubtedly accompany only the formation of chorioepithelioma and mole and are probably not to be found in any associated condition.

There are many references in the literature as to the occurrence of cysts of the ovaries accompanying pregnancy, mole or chorioma, but I am sure that many of these references are only to small cysts, which disappear spontaneously after expulsion of the mole or the fetus, as the case may be. From the appearance of such large cysts as here described, and described elsewhere in the literature, I am sure this is an uncommon condition.

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DIAGNOSIS. Here as in the first case one must differentiate between the presence of tuberculous peritonitis. The presence of ovarian tumors with mole, or history of mole having been expelled, should lead one to suspect the formation of these tumors.

PROGNOSIS AND TREATMENT. Eden and Lockyear assert that some of these cysts recede following the expulsion of the mole, and some such cases have been recorded by Russell, Andrews and Albert, but this literature is not available. Findley comments that occasionally cystic ovaries become greatly reduced in size following delivery of the mole, and reports in the 58 cases collected by him that in only 4 was there any retrogressive change following the expulsion of the mole. Still, he does not specifically state that these were large lutein cysts such as described in this condition.

In view of the fact that the literature in the large majority of cases connects this condition with the presence of chorioepithelioma and that the condition is undoubtedly a retrograde metamorphosis from the normal cystic conditions found in the ovary, I believe that we are perfectly justified in not waiting for the recession of these tumors but that we should operate and remove them when found. The small cystic tumors of the ovaries, accompanying mole, I would be inclined to keep under observation. Whether we should do a hysterectomy at the same time as the removal of the tumors remains an open question.

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A NEW METHOD OF COVERING RAW SURFACES UPON THE UTERUS

By George Gellhorn, M.D.
St. Louis, Mo.

It is a surgical axiom that raw surfaces within the abdominal cavity should be covered with intact peritoneum. This, in many instances, is a comparatively easy procedure when only small parts of the intestines have become denuded. When more extensive portions of the intestinal tract are involved, as in the case of removal of large and widely adherent ovarian tumors or fibroids, the prevailing custom is to leave these areas of denudation to themselves. It is not only impractical to stitch over the affected field in its entirety, but actual observation has proved abundantly that adhesions between intestinal loops do not often affect the well-being of the patient. As soon, however, as intestines or omentum become adherent to the uterus a train of unpleasant symptoms inevitably ensues. A pulling sensation in the upper part of the abdomen, gastro-intestinal disturbances of various degrees and more or less ill-defined pains occur, and even transitory ileus-like phenomena, are not uncommon. On the part of the uterus the abnormal attachment of loops of intestine with a varying amount of distention leads to a decreased mobility of this organ, and, in its further development, to menstrual disturbances. The continued pull exerted by the structures above and behind may eventually force the uterus backward and may, in some cases, even undo the result of a previous antefixation operation.

Here, then, is the problem that confronts us. We have set

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out to do a Gilliam operation or one of its numerous modifications or substitutes in a case of fixed retroflexion. We have broken the adhesions that held the uterus glued to the depth of the cul-de-sac or the rectum. We have shortened the round ligaments and now behold the uterus lying in a more normal position, but with a more or less extensive area of denudation upon its fundus which invites the speedy formation of new adhesions.

Or take, as a second possibility, the case of an inflammatory process in one of the tubes in which adhesions are rarely confined to the affected side but implicate the uterus as well. Shall we remove the diseased tube and ovary and close the abdomen without an attempt at peritonealizing the raw fundus? When a bilateral pyosalpinx of gonorrheal origin demands the extirpation of both tubes my personal choice is a pan-hysterectomy, after which the covering of the entire field of operation with intact peritoneum is an easy matter. I am aware, however, that such radicalism, despite its well-established advantages, has not yet become a general practice, and the question is still before us how to protect the uterus from further harm, useless though it is as an organ after a double salpingectomy.

It is evident that these two categories of fixed retroflexion and of adnexal disease constitute a not inconsiderable percentage of our gynecologic operations, so that a method of covering the denuded uterus with intact peritoneum may lay claim to practical importance. The very sporadic efforts that have been made in the past have been very discouraging. The "Cargile membrane" of R. T. Morris has never become popular, and the grafting of pieces of omentum, first introduced into surgery by Senn, has been largely disappointing.

Yet the difficulty is easily solved by a procedure the various steps of which are as follows: The fundus is grasped by a vulsellum and pulled backward and upward in the direction of the promontory. The reflection of the bladder peritoneum upon the cervix, which now becomes plainly visible, is incised transversely as in a hysterectomy and pushed off from the

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uterus (Fig. 1). If this blunt dissection with the finger is gentle enough and does not extend into the broad ligaments, the bleeding is usually insignificant and is quickly checked by the pressure of a sponge. The uterus is then tilted forward, the bladder peritoneum is pulled over the uterus and stitched to the posterior aspect of the fundus, where an intact peritoneal surface presents itself. (Fig. 2). In small uteri the bladder peritoneum may be fastened as far back as the insertion of the sacro-uterine ligaments if necessary. After the first or second turn of this continuous catgut stitch the vulsellum is removed and the stitching is continued until the entire fundus with its denuded area has disappeared beneath its new peritoneal covering. By using an inverting stitch, even the catgut knots become invisible. The newly formed covering consists only of the bladder peritoneum which, in many cases, is so thin and transparent that the raw uterine surface and even the vulsellum holes may be distinguished.

The method just outlined not only supplies the raw fundus with a new serous coat but it also safeguards a normal position and mobility of the uterus, and the late results have remained most satisfactory. It is, however, not to be relied upon exclusively in a case of fixed retroflexion. In such a case the order of the operative steps are these: (1) Loosening of the bladder peritoneum as described above; (2) shortening of the round ligaments; (3) fastening of the bladder peritoneum to the back of the uterus beyond the area of denudation.

I anticipate two pertinent questions: Is the function of the bladder disturbed after this procedure? What happens to the bladder in a subsequent pregnancy? In the six or seven years that I have employed the method I have never observed an instance of vesical disturbance other than those that may follow any laparotomy. A moment's visualization of the conditions created will supply the theoretic explanation of the absence of postoperative complications. The relations of bladder and uterus are not essentially altered. The uterus still lies on top of the bladder. Only the peritoneum which at this point is loosely connected with the bladder is stretched

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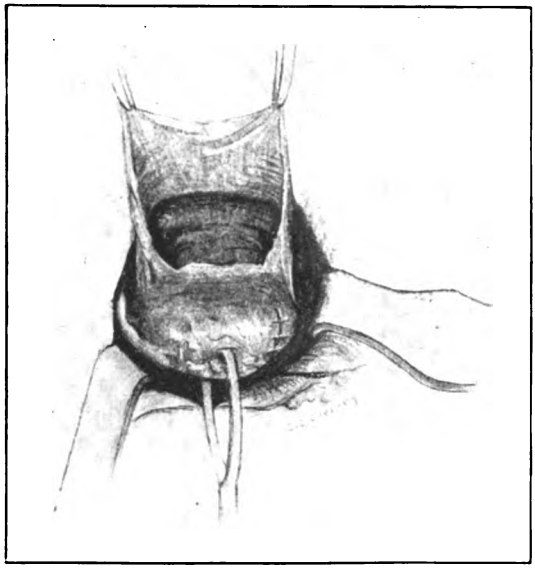

FIG. 1.—The bladder peritoneum has been pushed off the cervix and is held ready to be reflected across the fundus. Note the bladder in the depth of the wound.

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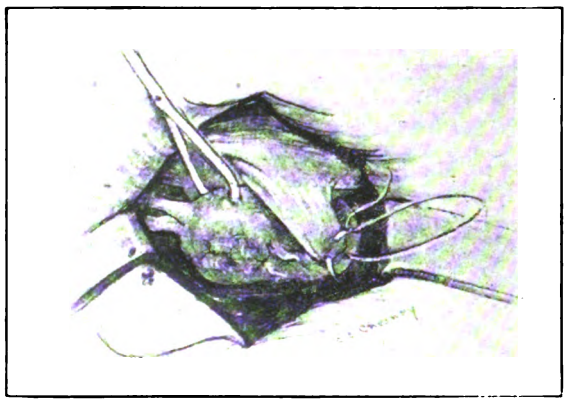

FIG. 2.—The apron of bladder peritoneum is being stitched to the posterior aspect of the fundus.

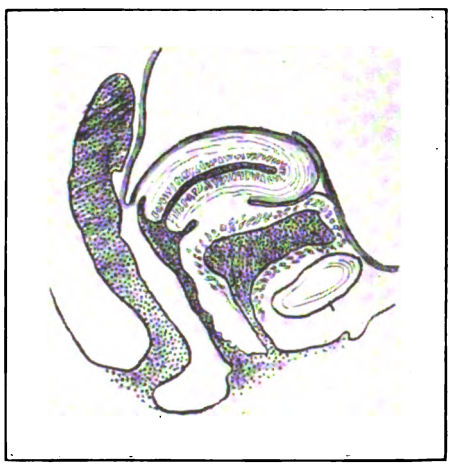

FIG. 3.—A diagrammatic view of the postoperative conditions shows the relation of bladder and uterus unchanged. Hence no probability of vesical disturbances.

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and pulled across the fundus (Fig. 3). The bladder, at the border of the posterior and upper walls, may adhere to the uterus a little higher than normally, but still on its anterior aspect. Hence the filling of the bladder with urine will cause neither subjective nor objective disturbances.

The same freedom of the bladder obtains in pregnancy and the gravid uterus may rise into the abdominal cavity without dislocating the bladder much more than is the case normally. I have seen one case which terminated in a miscarriage after four months. This patient at no time complained of vesical symptoms. None of my other private patients has conceived thus far.[1] I have no knowledge whether any of my hospital patients have become pregnant, because our follow-up system is as yet undeveloped. Theoretically the probability of pregnancy in the class of cases concerned is not very promising. Pathologic changes within the uterus that may have become permanent, alterations in the function or structure of tubes or ovaries, azoöspermia in the husband—all these factors may militate against conception.

The plan of preventing uterine adhesions is so simple and so self-evident that I doubt not but that others may have invented the method for themselves. In any event I submit it for your consideration with the conviction that it will still further increase the efficacy of our gynecologic operations.

[1] *Addition at proof reading.* Another patient has conceived since. She is now four months pregnant and quite free from any bladder disturbance.

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THE OPERATIVE TECHNIC EMPLOYED IN THE CLOSURE OF AN EXTENSIVE VESICO-URETHRO-VAGINAL FISTULA

By George Gray Ward, Jr., M.D.
New York City

The following case is reported because of the difficulties encountered owing to the extensive loss of tissue, the result of numerous futile attempts at repair, and because in all such cases no set method of procedure or technic can be depended upon on account of the varying conditions to be dealt with. The improvization of technic necessary may be of value to others in stimulating and guiding their ingenuity in solving similar problems.

No more distressing and pitiful sufferers appeal to us for aid than these poor women who have gone through repeated operations only to be increasingly disappointed as hopes become less and less after each failure.

As it was the cry of these sufferers for help some sixty-five years ago that led to the birth of gynecology as a specialty, so today, although they are not so numerous, there are still sufficient of those disappointed ones seeking aid to emphasize the need of special men devoting their energies to this special surgery.

Mrs. M. S., aged twenty-nine years, came under my care at the Woman's Hospital in May, 1919, complaining of complete inability to hold her urine since an instrumental delivery four years previously. She had been married eleven years. Ten years ago, when seven months pregnant, she had an instru-

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mental labor with a resulting still-birth. She was lacerated and repaired. The exact nature of the labor is unknown, but she was in bed for one month. She then had seven spontaneous miscarriages in the next six years of from two and one-half to five months' duration, with curettage after each. On December 8, 1915, when six and one-half months pregnant with twins, the membranes ruptured spontaneously and an instrumental delivery was performed. On the seventh day postpartum urine flowed continuously from the bladder. Two months later an attempt was made to close the opening in the bladder with failure, and in the following four years thirteen unsuccessful attempts were made by three different surgeons. Three years ago, during one of the attempts, an abdominal hysterectomy was done, but for what reason it has not been possible to ascertain.

In addition to the continuous escape of urine the patient complained of burning pain in the vagina and vulva and over the pubes, with constant distress from the extensive excoriations which were over the vulva and thighs.

The patient was a well-developed woman, 5 feet 5 inches in height, weighing 150 pounds, and in good physical condition other than her local disability. The examination showed the external genitals and the vagina edematous, red and excoriated, with numerous phosphatic deposits embedded deeply in the tissues. The entire anterior vaginal wall was absent, the base of the bladder being completely gone, with the ureters opening into the vagina. The vaginal margins of the fistula were very much inflamed and bled easily to touch. The urethra was absent, with the exception of a small, thin, quadrangular flap of tissue one-half to three-quarter-inch in length, which hung dependent from the vestibule and which was perforated by the external meatus. The cervix had apparently been amputated at some time independently of the hysterectomy, which was evidently a supravaginal operation, as a stump could be palpated above the flush vaginal vault. The pelvic floor was moderately relaxed. This large vesico-urethrovaginal fistula, with loss of the urethra, seemed a well-nigh hopeless

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problem in view of the extensive loss of tissue, evidently the result of the many operative attempts at a cure (Fig. 1).

It was obviously impossible to attempt any operation until the inflamed condition of the parts was cleared up and the phosphatic deposits removed. The patient was kept in bed and given daily hot douches and boroglyceride packs, and zinc oxide ointment was used externally. The prescription which was employed so successfully by the late Dr. Thomas Addis Emmet to render the urine acid and to prevent the formation of phosphatic deposits was also given. This prescription is of the greatest value for this purpose, and we consider it a *sine qua non* in the preparation of these cases for operation. It is as follows:

℞—Acid benzoic . . . . . ʒiss
Sodii borate . . . . . ʒij
Aquæ . . . . . ʒviij

N.S.—Tablespoonful in water, t. i. d., and reduce to ʒj doses after four days.

The removal of the phosphatic deposits was an extremely painful process, and it was necessary to repeatedly anesthetize the patient to allow of this being done properly. This course of preparatory treatment lasted for a period of six weeks, when the tissues were finally recovered from their inflammatory condition.

On July 7, 1919, the operation was performed, with the following technic:

The patient was placed face downward fn Bozeman's position, the hips being markedly elevated. A large vaginal retractor was inserted and the perineum retracted upward. This posture ensures a complete ballooning of the vagina and of the bladder and allows the blood to run into the bladder and therefore does not interfere with the operative work. I consider this posture of the greatest value in this type of case and that it was one of the prime factors in the result obtained (Fig. 2). The ureters were then probed to establish their location, so as to avoid injury. A strip of tissue from one-half to

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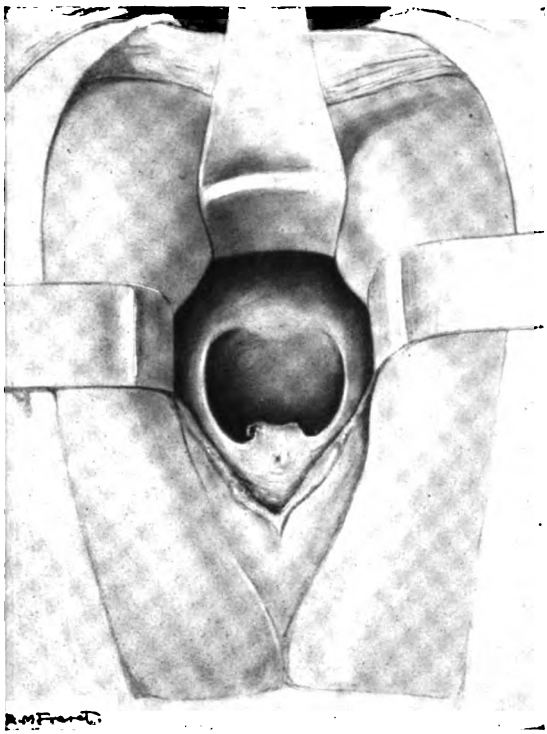

FIG. 1.—Showing loss of tissue in vesico-urethro-vaginal fistula.

FIG. 2.—Patient in Bozeman's position, with hips markedly elevated.

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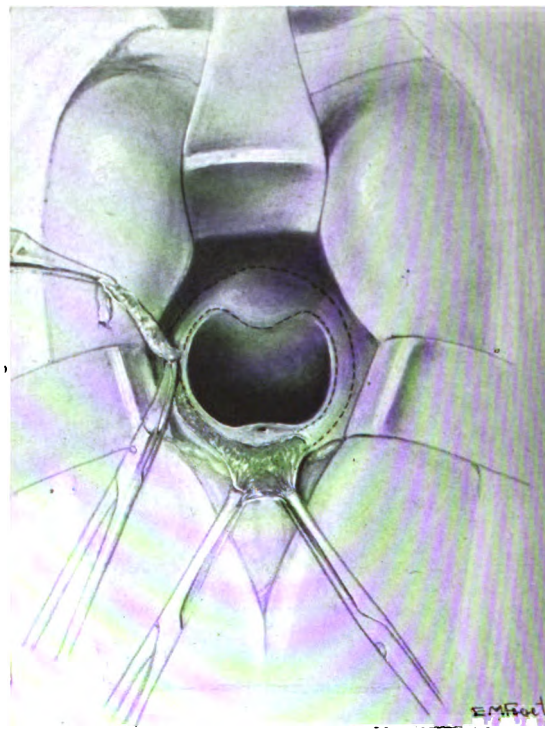

FIG. 3.—Excision of strip of tissue around edges of cavity.

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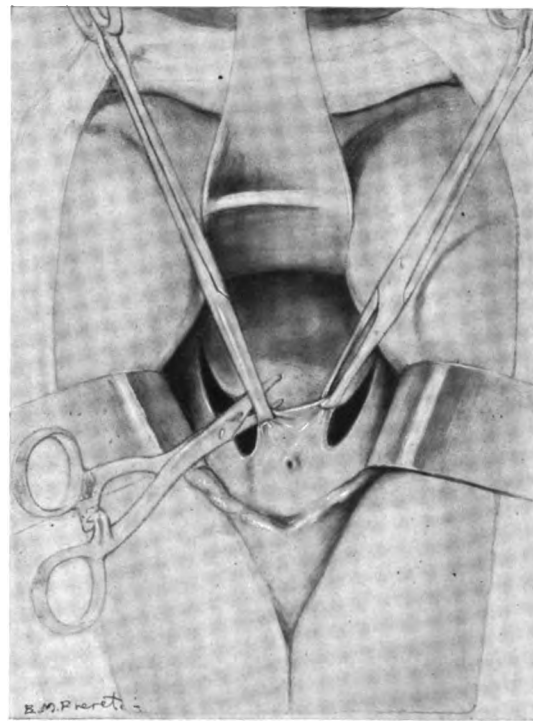

FIG. 4.—Traction applied with bullet forceps to cervical stump and toward urethra changing fistulous opening from O to U shape.

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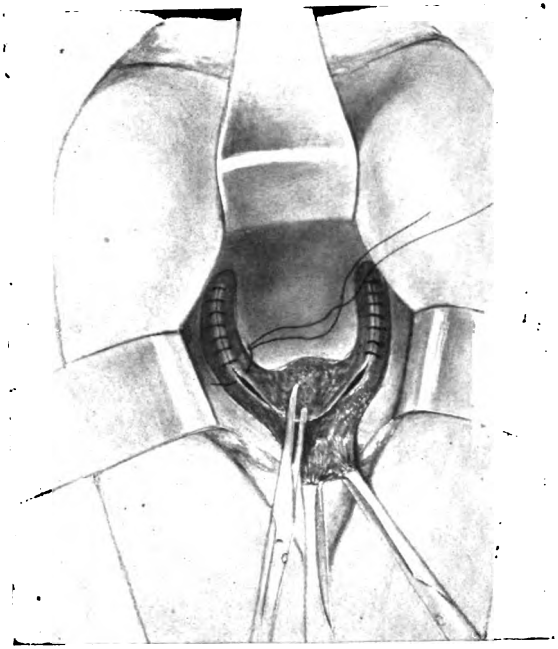

FIG. 5.—Edges of denudation closed by interrupted sutures of No. 1 catgut and silkworm-gut sutures.

FIG. 6.—Quadrangular flap at site of urethra sutured over the denuded cervical stump.

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three-quarter-inch wide was denuded with scissors completely around the edges of the cavity, extending across the site of the stump of the cervix, which had been amputated, and also extending on the inner surface of the quadrangular flap at the site of the urethra (Fig. 3).

The cervical stump was next grasped with a bullet forceps and traction toward the urethra made easy approximation of the tissues lateral to the cervical stump, throwing the margins of the fistula into angles in the lateral fornices, so that the fistulous opening which was originally like the letter O now became shaped like the letter U (Fig. 4).

The vesical edges of each angle were then closed by interrupted sutures of No. 1 tanned catgut. A second layer of interrupted sutures of silkworm-gut was passed through the vaginal mucosa and the denudation of both sides and the ends left long and tied together. The quadrangular flap at the site of the urethra was placed over the denuded stump of the cervix and sutured in a similar manner (Figs. 5 and 6).

The result of this technic was a complete closure of the defect without tension.

A self-retaining catheter was inserted into the bladder through the urethral meatus and the bladder was washed out with boric acid solution. Great care was taken to wash out the catheter daily with a syringeful of boric solution, to keep it clear and clean, and the catheter was changed every four or five days. It was retained for twelve days, at which time the sutures were also removed.

The wound healed by primary union and was entirely closed except a small pin-point opening on one side of the meatus. The result was most satisfactory, as, although the patient had no vesical sphincter, she is able to retain her urine without leakage for a period of two to four hours in the erect posture, when she has to empty her bladder, and at night she can go considerably more than four hours on occasions, depending upon the quantity of urine being excreted.

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DISCUSSION ON THE PAPERS OF DRS. GEORGE GELLHORN AND GEORGE GRAY WARD, JR.

DR. CHANNING W. BARRETT, Chicago.—In closing this extensive vesicovaginal fistula Dr. Ward has shown much ingenuity in this particular procedure. Previously he has laid quite a good deal of stress upon the advisability of getting away from the mere border of the fistula and treating it as a cystocele, starting in healthy tissue first. As there was no healthy tissue here to follow in the way of cystocele, he has been thrown back upon this procedure. In an extensive injury such as this patient had, inasmuch as there was no urethra there, no sphincter vesicæ, I might have chosen the procedure of closing up the vaginal outlet and directing the urine into the rectum as Dr. Peterson has shown may be done. He presented experimental work which shows fairly good results as regards sphincteric control, non-irritability of the rectum, fair absence of infection of the bladder and the ureters from the rectum. However, if this result can be brought about with a patient able to go six or eight hours without urinating, I should say this method would have advantages over that. We would hardly expect patients without sphincteric control to be able to go that length of time even in bed, and much less so when they are up and about. It is not always easy to get good union of such tissues throughout the whole area in extensive cases of this kind. No matter how much we admire the great brilliancy and patience of Dr. Marion Sims and honor him for the original work he did, we would hardly use his method extensively now. Nobody ever attained the great dexterity and achived the success that Sims did in dealing with fistula in that way. The great success in dealing with fistula is, instead of one membrane to deal with as a whole, we have two distinct membranes to be dealt with separately, the bladder wall and the vaginal wall.

By mobilizing the bladder when it is possible, any sort of opening can be approximated; it results only in diminution in the size of the bladder that is left, and if we can get union the bladder will eventually distend.

Another great virtue is, instead of dealing with a closure like we have in the rectum, we can keep the bladder empty during the time of healing so that any strain upon the sutures can be taken off. I would lay stress in extensive cases, where such a

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weak place has been encountered, upon the advisability of making a temporary fistula anteriorly, opening the bladder and getting drainage anteriorly while healing is taking place. There is no difficulty in getting closure of an anterior opening, and by keeping the patient in Sims' position on the side opposite to the weak place, as the fistula is seldom in the median line, the suture can be kept almost absolutely clean from urine while healing takes place, and that facilitates closure in some cases.

Another point in regard to the closure. If we leave the vagina the natural length, and if the cervix opens separately from the bladder, it is usually not difficult to separate the bladder from the uterus instead of pulling the uterus down. A patient would be willing to put up with a little disability of displacement rather than have a vesicovaginal fistula, but we do not want the uterus down at the outlet if we can help it and that can be prevented by separating the bladder from the uterus, and almost any sort of opening can be closed. Some cases of vesicovaginal fistula are easy to close, while in others by reason of scar tissue we have great difficulty in getting at them; we have difficulty in getting good tissue separate from the pubic bone. These difficulties are such as to tax the ingenuity of the most skilled operator, and I congratulate Dr. Ward that he has met the difficulty here in a most unusual and most severe case.

I was interested in the ingenious method described by Dr. Gellhorn for covering the uterus. A great help in doing abdominal surgery I think is, that there is no great tendency to adhesions unless there is some reason for adhesions to take place. In reoperating cases we usually find, if the omentum has become greatly adherent to the uterus, or the bowel has become greatly adherent to the angle of that side, that it is because there has been reinfection in the stump by reason of not having taken out the angles of the uterus, but if it is necessary to cover any portion of the uterus, by this procedure it can be done. It suggests itself to me that if there is any irritation of the bladder at all, we can go a little higher and get the peritoneum a little farther from the abdominal wall. It has great play there and can be brought down.

Dr. Reuben Peterson, Ann Arbor, Michigan.—At the suggestion of Dr. Gellhorn I have tried this procedure in a number of cases and am rather pleased with it. It has a limited field where one must cover the uterus, or where it is desirable

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to do so. I think it will be a valuable addition to our technic. I should not be at all afraid of pregnancy supervening after this operation.

With regard to Dr. Ward's case, I cannot agree with Dr. Barrett as regards the advantages of utilizing the rectal sphincter as compared with the results obtained by Dr. Ward. I have done this operation in a number of instances and have worked up the literature of it. While the patient is able to hold her urine and is comfortable as compared with being wet all the time, she does not enjoy her condition. These women bitterly complain for obvious reasons. The operation should be reserved for those cases where the patients can be made comfortable by no other means.

Dr. Ward's technic is very interesting. It shows what can be done with these enormous fistulæ by dissecting away the bladder from the vaginal surface. However, I do not see why if the bladder sphincter has not been restored she does not continue to have a dribbling of the urine.

DR. WARD.—When she is on her feet the urine runs over when its level reaches the urethral opening in about two hours, and at night when she is lying down she can go four hours without urinating.

DR. PETERSON (resuming).—I desire to add one thing to what I have already said. Dr. Barrett spoke of opening the bladder so as to get drainage and enabling these urethral fistulæ to heal. There is a better procedure than that if we utilize what the urologists are doing after prostatectomy. They drain the bladder from above by a system of vacuum bottles so that practically no urine escapes by the perineal route. If we will adopt the same method in the closure of vesicovaginal fistulæ and urethral fistulæ then these fistulæ will heal without any urine escaping from the urethral opening. I have cured one case of urethral fistula which many operations had failed to cure by the use of this technic. This to my mind is a valuable addition to the technic of the closure of urethral fistulæ, because infection always occurs where you have to drain the urethra or the bladder by means of the catheter.

DR. JAMES E. KING, Buffalo, New York.—As Dr. Ward has said, these accidents are very much rarer than they used to be,

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and I think I have had probably the average experience with the ordinary vesicovaginal fistulæ. It was not, however, until three weeks ago I encountered a case in which a family doctor (the patient living out of town about fifty miles) had applied forceps to this case and in using traction was greatly surprised to see the head suddenly emerge, with a fluid which he took to be amniotic fluid. Upon examination after the delivery he discovered he had pulled the entire urethra from the base of the bladder. Upon the patient entering the hospital four months later I found she had an opening at the point where the base of the bladder admitted a finger, the urethra being split entirely open. The problem which presented itself in this case was the question of getting the vesical sphincter together. In repairing it I found no indication of the sphincter of the bladder, but I attempted to bring the tissues together in such a way that if such a sphincter was there, I might approximate the ends. The urethra was then built up as best as I could and I then put in a drain through the vagina and sewed in the tube. I was surprised upon removing the drain through the artificial opening which I had made to find my patient was able to retain her urine, and even now, if she is on her feet, she can go four or five hours without urinating. We have not decided to extend the capacity for holding urine, but she has already been reported as having passed 300 c.c. at one time.

An interesting point, as illustrated by Dr. Ward's case and the one I have recited, is this: Neither he nor I obtained a sphincter on which we could rely to control the bladder containing urine, but so far as my own experience goes and that of Dr. Ward, the sphincter of the bladder is not of such great importance in retaining urine as is the sphincter of the rectum in controlling the rectal contents.

Dr. C. Jeff Miller, New Orleans, Louisiana.—There are a few salient points, regarding the technic of closing vesicovaginal fistulæ, that are fundamental, and must be kept in mind, whether the fistula is a small uncomplicated injury or a large opening involving the urethral area, or urethra.

The first, and most important, is the necessity of dealing with the bladder as an independent organ. The cause of the majority of failures rests in the scar tissue of the vaginal wall, which presents so much tension, that the sutures slough. The anterior vaginal plate stretches between fixed points of the

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pelvis, and permits of only a minor degree of adjustment; therefore the vaginal plate must be freely incised, the release of the bladder wall accomplished by dissecting from the normal area into the scar tissue, and freed sufficiently in every direction to allow the bladder opening to be inverted and sutured without tension.

Failure to appreciate the necessity of this wide separation, especially when the opening is held close to the bony structures, spells disaster in many cases. In four very extensive fistulæ, I have performed a combined vaginal and abdominal operation. Separation was first carried out as far as possible through the vagina, then completed through an abdominal incision, the opening being closed per vaginam. Two of these cases were openings closely attached behind the symphysis, and presenting extensive infiltration. In another case, where practically the entire bladder base was destroyed, it was comparatively simple to close it by the combined vagino-abdominal method, and the result was especially satisfactory. The bladder capacity was reduced to two ounces for a few weeks, but eventually accommodated itself to hold eight ounces.

Another point, that I wish to emphasize, is the importance of careful dissection and preservation of structures, when dealing with fistulæ involving the urethra. In 2 bad cases of this type, recently operated upon, in which I despaired of sphincteric control, the function was perfect. We cannot identify the sphincter fibers in any dissection, but by carefully approximating the urethral structures, we are frequently most agreeably surprised at the perfect results. Closing large fistulæ, by using the uterus as a plug, must be resorted to occasionally, but subsequent complications are frequent, and the procedure should be reserved only for exceptional cases.

Dr. J. Wesley Bovée, Washington, D. C.—As regards the ingenious operation devised by Dr. Gellhorn, I agree with Dr. Peterson that it has a small sphere of usefulness. In the large proportion of cases which we find of Neisserian infection of the uterus and appendages, requiring the removal of the Fallopian tubes, I think most of us decide always to remove most of the uterine mucosa, which will include most of the uterine body, and in the presence of infection we would expect any adhesions to take place to the posterior wall. In such a case as that in which I find Neisserian infection outside the uterus, I resort to

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vaginal drainage by paraffin stearin gauze brought over the raw surfaces and left a sufficient length of time to allow endothelization to take place.

As to the fistula work, it is very important. Some of these cases of fistulæ are very difficult and tedious to handle. I have seen cases in which I have never got around to do the operation of closing the opening between the vagina and bladder because of the condition of the urine and the condition of the bladder itself. I know one woman in whose case I tried for three periods of four months each to get rid of alkaline urine infecting the condition of the bladder. When she first came in I removed a calculus that nearly plugged a large opening which she had in the septum. I built a urethra for her easily. There was no evidence apparent that she had ever had a urethra. I passed a bistoury from the pubic arch to the interior of the bladder, puncturing the bladder mucosa. I then made a vaginal flap and drew it forward from the bladder through the canal I made with the bistoury, sutured the end of it near the pubic arch and secured for her a urethra. I see her occasionally, and bring her into the hospital, but I have not decided it is safe yet, on account of the condition of the bladder, to close the fistulous opening.

I am quite in accord with the idea Dr. Peterson has given us as to suprapubic drainage in these cases, particularly if we have have surgical work to do on the sphincteric muscle of the bladder and on the urethra, not so much where these are intact, in operating on the fistula.

Dr. Robert L. Dickinson, Brooklyn, New York.—In gynecologic globe trotting one sees a surprisingly large number of general surgeons and a smaller number of prominent gynecologic surgeons who do not peritonealize or do not do so adequately. I saw a leading man within two months leaving large raw stumps after hysterectomies. A method like Dr. Gellhorn has described will increase our resources, and it is of very great value, and it may have been so in those cases where you resorted to some other technic which involved raw surfaces. We therefore welcome such a procedure as Dr. Gellhorn has given us.

Dr. George Gray Ward, Jr., New York City (closing the discussion).—In this particular case, in a woman, aged twenty-nine years and married, the procedure suggested by Dr. Barrett of colpocleisis would have been out of the question. She never would have consented to it.

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STATUS OF THE INTRA-UTERINE STEM PESSARY

BASED ON A STUDY OF 205 CASES, WITH END-RESULTS IN 117 CASES

By Reginald M. Rawls, M.D.,
New York

(Read by Title)

The intra-uterine stem pessary has been used in gynecology for a little over a century, and numerous articles have been published setting forth its therapeutic value, but up to the present time its status is still undetermined. In a recent *Year-book on Gynecology and Obstetrics* appeared an abstract of an article which claimed that the stem-pessary was of value in certain conditions, and immediately following this abstract was the editor's note stating that "the stem pessary is dangerous and of doubtful value in any condition." Therefore in the following study it will be my endeavor to establish the status of the intra-uterine stem pessary.

From October 1, 1915, to September 30, 1919, there were treated in the Woman's Hospital 9003 patients on whom were performed 15,823 operations. During this period 205 intra-uterine stems were inserted which gives for this operation 2.3 per cent. of the patients under treatment and 1.3 per cent. of the operations performed. Of the total number of patients for this period of time 309 had either dysmenorrhea, amenorrhea, sterility, anteflexion of the uterus, congenital malformation of the uterus or stenosis of the cervix. In any one of these conditions the stem might have been used, and yet it was used in only 51.7 per cent. of the number. Thus this series

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would seem to represent the conservative use of the stem by twenty-eight surgeons in 96 private and 109 ward cases. Therefore the analysis of these cases should obviously give us a better average primary and end-result than the study of a series of cases of an individual operator.

The indications for employing the stem were: Dysmenorrhea in 107, or 52.2 per cent.; sterility in 47, or 22.9 per cent.; dysmenorrhea and sterility in 23, or 11.2 per cent.; conditions other than dysmenorrhea, or sterility in 15, or 7.3 per cent.; in 13 of the private cases indications for the operation were not obtained. Insertion of the stem alone was done in 147 cases, combined with minor operations in 13 cases and combined with major operations in 45 cases. Preliminary to insertion of the stem, divulsion and curettage, with sharp curette, were used 173 times; divulsion and curettage, with dull curette, 11 times; and divulsion alone, 21 times. The curettings were examined microscopically in only 48 cases and showed normal endometrium in 33, or 68.8 per cent.; hyperplasia in 10, or 20.8 per cent.; and interstitial changes in 5, or 10.4 per cent.

We have records in 186 cases, which show that the hard rubber or Davenport stem was used in 102, or 54.8 per cent.; the glass stem in 80, or 43 per cent.; the straight or Baldwin in 40 and the curved or Ward in 40; and the "Wylie drain" in 4, or 2.2 per cent. For 124 cases the stem remained *in situ* in 16 under one month; in 36 from one to two months; in 24 from two to three months; in 15 from three to four months; in 3 from four to five months; in 1 for five months; and in 29, or 23.4 per cent., the stems cut out in part or in whole. Of these 29 cases, in 20, or 69 per cent., the glass stems were used, 15 curved and 5 straight, and in 9, or 31 per cent., the hard rubber stems were used. The methods for securing the stems were for the hard rubber two to four individual sutures and for the glass two to four point suspension sutures secured by shot and washers or bone buttons, and in only 1 case was silver wire used.

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I. SEQUELÆ OF INSERTION OF INTRA-UTERINE STEMS

1. POSTOPERATIVE TEMPERATURE. In determining sequelæ our attention is first directed to the postoperative temperature curve, and a study of this shows that in 147 cases of insertion of the stem with a preliminary divulsion or divulsion and curettage, sharp or dull curette, the temperature remained below 100° F. in 90, or 61 per cent.; ranged from 100° F. to 101° F. in 50, or 34 per cent.; and to 101° F. and above in 8, or 5 per cent. If we consider the temperature below 101° F. as a normal operative reaction it will be necessary only to analyze 8 of these cases. In 7, or 87.5 per cent., a preliminary divulsion and curettage, with a sharp curette, were done, and in 1, or 12.5 per cent., a divulsion only preceded the insertion of the stem. In none of these is a microscopic examination of the endometrium recorded, and as it is a rule of the hospital to send all tissue to the pathologist for diagnosis it is reasonable to assume that the material removed was macroscopically normal or that the curettage was only a matter of routine. However, all things being equal, it seems that the preëxisting condition of the endometrium is not a factor in the postoperative rise of the temperature, for in 48 cases in which a microscopic examination was made, but 5, or 10.4 per cent., showed interstitial changes, and but 10, or 20.8 per cent., showed hyperplasia, and of the former but 1 and of the latter but 2 had a rise of temperature to 100.8° F. It is interesting to note that the sharp curette was used in all but one of the cases which had a temperature above 101° F., and this case only had a divulsion.

A further analysis of the 7 cases in which a divulsion and curettage preceded the insertion of the stem shows in two of them a preoperative diagnosis of salpingitis, and in addition in one of these there was also an endocervicitis and a weak positive Wassermann. In both of these it seems to the writer that there are contraindications to the use of curettage as well as to the stem. In a third case there was a postoperative lighting up of an old pyelitis or cystitis which might have occurred after any operative procedure. Abstract of these cases follows:

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CASE 1 *(Exacerbation of a Chronic Salpingitis).* Mrs. N., aged thirty-five years, married five years but never pregnant. Pain in and swelling of lower abdomen and primary sterility. Left tube palpable and tender, and a diagnosis of salpingitis was made. Patient under observation for fifteen days, during which time a study with roentgenray plates was made of the gastro-intestinal tract, and at no time was the temperature higher than 99° F. Under anesthesia on the sixteenth day a diagnosis of primary sterility was made and a divulsion and curettage and insertion of stem pessary was done. No microscopic examination of the curettings is recorded. Three days later there was a foul vaginal discharge and the stem pessary was removed and douches ordered, but the following day the discharge was thick, yellow and very offensive. Up to this time the highest temperature was 99° F., but the evening of the next, or fifth, day the temperature rose to 102.8° F., and the patient complained of intense abdominal pain, accompanied by persistent nausea and vomiting. At the end of another twenty-four hours the temperature still registered 102° F. and did not remain normal until the fourteenth day after operation. Patient last examined three months after operation and the cervix was eroded, and there was a mucopurulent vaginal discharge and the left adnexæ were thickened and tender to palpation.

NOTE. The divulsion, curettage and insertion of the stem caused the acute exacerbation of a chronic tubal condition, but the blame for this should be charged to the operator rather than to the operation.

CASE 2. *(Suspected Salpingo-oöphoritis; Positive Wassermann and Chronic Endocervicitis).*—Mrs. C., aged twenty-eight years; never pregnant. Complained of a drawing pain in the right lower quadrant and sacral backache and vaginal discharge of ten years' standing. A preliminary diagnosis, not substantiated under anesthesia, was made of bilateral salpingo-oöphoritis and the patient subjected to a divulsion, curettage and insertion of a straight glass stem. Examination

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of the blood showed a weak, positive Wassermann, but no microscopic examination of the curettings is recorded. On the operative history appears the following: "On account of an infected cervical discharge (purulent) the cervix was thoroughly curetted with a sharp curette and an application of tincture of iodin made before the stem was introduced." Strange to record is the fact that in six hours the temperature only rose to 101.2° F., and in another twenty-four hours it was normal and so remained until the patient's discharge. Patient seen four months later, and no note is recorded except that the uterus was anteflexed.

NOTE. Fortunately no grave morbidity followed, but if such had been the case it should be charged to the operator rather than to the operation, for there were contraindications to any intracervical or intra-uterine operation.

CASE 3 *(Postoperative Pyelitis or Cystitis).* Mrs. P., aged twenty-five years, never pregnant. Severe dysmenorrhea and severe dyspareunia. Diagnosis: Anteflexion. Five days preceding operation the temperature rose from 97° F. to 98.6° F. Divulsion, curettage and insertion of curved glass stem held in place by two-point suspension suture of silver wire secured by shot, which cut out while the patient was still in the hospital. No microscopic examination of the curettings was recorded. For five days following operation the temperature ranged from 98.6° F. to 99.6° F., but at noon of the sixth day it rose to 102.4° F. and the next morning it was 99.4° F., but in the afternoon it rose to 102° F. There was an afternoon rise until the ninth day, when the temperature reached normal, where it remained until the patient's discharge on the eleventh day. The bedside notes of this case have been lost, but from the remaining history we find that the patient had to be catheterized but once and that the urine was reported to be normal before operation; but the day afterward it contained a trace of albumin and masses of pus cells. The morning after the first rise of the temperature the seventh day, there was a faint trace of albumin, pus cells and shreds of mucus. The

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eleventh day the albumin was not present, but there were a few pus cells. The patient was seen five months later, but while there was no return of her urinary symptoms her dysmenorrhea was not relieved.

NOTE. The temperature in this case was due to a pyelitis or cystitis, and, while due to the operation, was in no way due to the particular form, and might have followed any operative procedure or even an examination under an anesthetic.

In the abstracts of the following 5 cases, or 3.4 per cent., there is nothing to account for the temperature except the form of operation, and therefore it must be regarded as a sequela of the divulsion, curettage and insertion of the stem pessary or the divulsion and insertion of the stem. A review of these abstracts shows that the duration of the high temperature was short, with no permanent morbidity.

CASE 1.—Mrs. G., aged thirty years, married five and a half years, never pregnant, although two years ago she had been curetted. She complained of primary sterility, and a diagnosis was recorded of anteflexion. The week preceding operation temperature ranged from 98° F. to 98.4° F. A divulsion, curettage and insertion of a Davenport stem held in place by four silkworm-gut sutures was followed by temperature from 98.4° F. to 100° F. until the fourth day, when it rose to 101.2° F., but in four hours it was normal, where it remained until the patient's discharge on the tenth day. No microscopic examination of the curettings is recorded. The stem was removed at the end of two months and the patient was examined eight months later and the uterus anteflexed, adnexæ normal, but she was still sterile.

CASE 2.—Mrs. B., aged twenty-nine years. Married two years, never pregnant. Complained of dysmenorrhea and primary sterility, and a diagnosis made of anteflexion. Temperature for the four days before operation ranged from 97° F. to 98° F. and a divulsion, curettage and insertion of a straight glass stem was done. No microscopic examination of

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the curettings is recorded. Four hours later the temperature rose to 101.2° F., but in thirty-six hours it dropped to normal, where it remained until the patient's discharge the sixth day. No follow-up was possible in this case.

CASE 3.—Mrs. B., aged twenty-five years; never pregnant. Complained of dysmenorrhea and irregular menstruation. During the four days preceding operation temperature from 96° F. to 98.8° F. Divulsion, curettage and insertion of a straight glass stem held in place by a two-point suspension suture of silkworm gut. No microscopic examination of the curettings recorded. Six hours after operation the temperature rose to 101.6° F., but was normal the next morning and ranged from 98° F. to 99° F. until the patient's discharge on the seventh day. The stem was removed at two and a half months and the patient seen seventeen months after the operation and was relieved of dysmenorrhea, but was just as irregular as before operation.

CASE 4.—Mrs. J., aged twenty-six years, never pregnant. Complained of dysmenorrhea and a diagnosis of anteflexion was made. Divulsion, curettage and insertion of a Davenport stem. No microscopic examination of the curettings recorded. Temperature normal before and twenty-four hours after operation, but four hours later it rose to 101.8° F., and in another four hours it rose to 103.4° F. Patient complained of being very uncomfortable; there was headache and profuse perspiration. She was given phenacetine and caffein, and at the end of four hours the temperature was 99.2° F. The succeeding four days the temperature rose from 98° F. to 99° F. Patient seen one year after operation and was in good condition and the dysmenorrhea was improved.

CASE 5.—Mrs. M., aged twenty-eight years, never pregnant. Complained of sterility and amenorrhea for twenty months. Diagnosis made of anteflexion and the cervix was thoroughly divulsed and a curved glass stem was inserted and held in place

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by a three-point suspension suture of silkworm gut. The temperature in six hours rose to 102° F., but in twelve hours it was 100° F. and for another twenty-four hours 100° F. to 100.4° F., and then remained normal. The follow-up shows that this patient became pregnant but miscarried.

In determining the sequelæ other than the postoperative rise of temperature it is necessary to follow the cases after their discharge from the hospital, and this has been possible in only 102 of the 147 cases, or 69.4 per cent. of those in which the insertion of the stem was accompanied with no other operative procedure except divulsion or divulsion and curettage. Therefore our percentages will now be based on the cases seen for at least one month after operation.

2. Retroversion *(Four Cases of 102, or 3.9 per cent.)*.

It is the experience of the author to find, at times, the uterus retroverted by the stem pessary, and this observation is borne out by this study. This most often occurs after the use of the Davenport stem, as there is a knob which extends into the vagina and gives the posterior wall of the vagina and the fecal column in the rectum the opportunity by their action to carry the cervix forward and the fundus backward. However, it may happen with a glass stem when it ceases to be entirely intra-uterine either when the suture is tied too loosely or cuts out from its high position in the cervix. The following are the abstracts of the 4 cases in which retroversion was caused by the stem.

Case 1.—Miss H., aged twenty-six years. Complained of severe dysmenorrhea, with vomiting, diagnosis made of anteflexion and a divulsion, curettage and insertion of a straight glass stem. Curettings not saved for microscopic examination. Temperature after operation from 98° F. to 99.8° F., but on the eleventh day there was severe backache, and an examination showed the uterus to be retroverted, and the stem was removed. Four months later the uterus was retroflexed and dysmenorrhea was unrelieved.

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CASE 2.—Mrs. R., aged nineteen years. Complained of dysmenorrhea and vaginal discharge. Diagnosis of infantile uterus made and divulsion and curettage, with dull curette and insertion of Davenport stem, was done. No microscopic examination of the curettings recorded. Temperature after operation from 98° F. to 100° F. and normal convalescence, but on discharge the eighth day the uterus was found retroverted and the stem was removed. Six months later the uterus was in normal position and the patient was relieved of the dysmenorrhea.

CASE 3.—Miss G., aged twenty-three years. Complained of dysmenorrhea and diagnosis was made of anteflexion, divulsion, curettage and insertion of the stem. The kind of stem used is not specified, but it was probably the Davenport, as this was the kind most often used by this operator. Microscopic examination of the curettings showed interstitial endometritis, but the temperature only ranged from 98° to 100° F. Patient seen ten weeks after operation and the dysmenorrhea was unrelieved and the uterus was still retroverted, but the adnexæ were normal.

CASE 4.—Mrs. T., aged thirty-two years. Complained of dysmenorrhea, and diagnosis was made of anteflexion. A divulsion, curettage and insertion of a Davenport stem was done and the postoperative temperature ranged from 97° F. to 99.2° F. On discharge the uterus was found to be retroverted and the stem was removed. Patient seen seventeen days after operation and was relieved of the dysmenorrhea, but the uterus was still retroverted.

3. IRREGULAR MENSTRUATION *(5 Cases of 102, or 4.9 per cent.)*.

In 5 cases, or 4.9 per cent., there were menstrual irregularities—amenorrhea, menorrhea and frequency or increased dysmenorrhea. The most severe were cases of menorrhagia, which occurred with the stems *in situ* and necessitated their removal. The following are abstracts of these cases:

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CASE 1.—Mrs. A., aged twenty-seven years. Pain before and throughout her menstrual period, which is scanty, with clots, otherwise normal as to time and duration. Diagnosis of anteflexion and a divulsion, curettage and insertion of Davenport stem. Curettings not saved for microscopic examination. Five weeks later patient reports that she has had a normal menstruation, although the stem was still *in situ*. In her fifth month after operation she reported that she had missed two periods and examination revealed no evidence of pregnancy. In her sixth month she reported that the menstruation was now normal and that there was pain only before instead of throughout her period.

CASE 2.—Mrs. G., aged twenty years. Backache and pains in the lower abdomen for four weeks and secondary sterility. Diagnosis of stenosis of the cervix and anteflexion. Divulsion, curettage and insertion of a Davenport stem. Microscopic examination of the curettings showed premenstrual uterine mucosa. Stem removed at the end of four weeks, and four and a half months later the patient reported that on two occasions she had menstruated twice in a single month. Previous to operation her menstruation had always been every twenty-eight days and of two days' duration.

CASE 3.—Mrs. K., aged twenty-eight years. Dysmenorrhea. Diagnosis of anteflexion and divulsion, curettage and insertion of a Davenport stem. No report of the microscopic examination of the curettings. For two years previous to operation menstruation was irregular as to time, three to five weeks, of three to five days' duration and moderate in amount, with dysmenorrhea. One year after operation the patient reported that menstruation was unchanged except that the dysmenorrhea was much more severe.

CASE 4.—Miss C., aged twenty-six years. Essential dysmenorrhea and at times a profuse thick white to yellow leucorrhea. Diagnosis of anteflexion and endocervicitis and a

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divulsion, curettage and insertion of a straight glass stem. Curettings small in amount and not saved for examination. Three weeks later menstrual period most profuse and accompanied by severe uterine colic. Medicinal measures and an ice-bag resorted to, but flow became hemorrhagic in character and did not let up until the stem was removed. Patient last seen several months later, but while the menorrhagia had not recurred the dysmenorrhea was not relieved.

CASE 5.—Mrs. H., aged twenty-eight years. Essential dysmenorrhea. Diagnosis of stenosis of the cervix and anteflexion and divulsion, curettage and insertion of Davenport stem was done. No microscopic examination of the curettings recorded. Four weeks later patient was seized with severe menorrhagia and the stem had to be removed. The patient seen ten months later and there had been no further menorrhagia, and the dysmenorrhea was relieved.

4. PARAMETRITIS *(3 of 102 Cases, or 2.9 per cent.)*.

In three cases, or 2.9 per cent., there was evidence of a parametritis, which was elicited through a vaginal examination by a tender thickening or exudate either in the lateral fornices or posterior to the uterus. The following abstracts show no permanent morbidity:

CASE 1.—Mrs. L., aged twenty-six years, complained of pains in the flanks, headache and menorrhagia. Diagnosis of anteflexion and undeveloped and retrocessed uterus. A divulsion, curettage and insertion of stem was done. The stem was probably a Davenport, as this was the form most often used by this operator. Stem *in situ* for two months, and when last examined at five and a half months after operation she reported relief of symptoms, but a bimanual examination showed the uterus retrocessed with an area of tenderness on the posterior surface of the uterus. Previous examinations made respectively at the second and third months did not disclose this tenderness, and it is a debatable point as to whether the stem caused this condition.

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CASE 2.—Mrs. L., aged twenty-nine years. Secondary sterility and amenorrhea for three months. Diagnosis of prolapsed ovary and sterility was made and divulsion, curettage and insertion of Davenport stem was done. Microscopic examination of the curettings showed normal uterine mucosa of the premenstrual type. Stem removed at three months and vaginal examination showed a small amount of thickening in the broad ligament. One month later the thickening had disappeared but the patient still had amenorrhea.

CASE 3.—Mrs. F., aged twenty-six years. Dysmenorrhea and diagnosis made of antefiexion and divulsion, curettage and insertion of Davenport stem was done. Microscopic examination of the curettings showed interstitial endometritis and hyperplasia of the uterine mucosa. The highest postoperative temperature was 100° F. and the convalescence was uncomplicated, and the patient was discharged the eleventh day. Six weeks later the stem was *in situ* with a slight exudate in the left broad ligament. One month after this the stem was removed and there is no record of the exudate previously described.

5. ADNEXAL DISEASE *(8 of 102 Cases, or 7.8 per cent.)*.

In 8 of the 102 cases, or 7.8 per cent., there were found varying degrees of adnexal disease, but if we exclude from this number the cases in which a preoperative diagnosis of salpingitis or a diagnosis of endocervicitis or retroversion requiring section was made, then the incidence of adnexal disease following the stem in uncomplicated cases will be but 3.9 per cent. Abstracts of these cases follow:

CASE 1.—(See Case 1 under Division 1, Postoperative Temperature).

CASE 2.—Mrs. A., aged twenty-eight years, married thirty-four months; never pregnant. Patient complained of dysmenorrhea and for two years general abdominal pain and

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pain in the rectum and vaginal discharge. Fifteen months before this admission she had, at the Woman's Hospital, an appendectomy, and the records show there were no pelvic adhesions and that the adnexæ were normal. Vaginal examination showed the uterus anteflexed and both tubes slightly enlarged and tender. The anteflexion but not the tubal condition was verified by the examination under an anesthetic, and a divulsion, curettage and insertion of a curved glass stem was done. Microscopic examination of the curettings showed normal uterine mucosa of the premenstrual type. Uneventful recovery, with highest temperature, 99.8° F., and the patient was discharged the eighth day after operation.

Patient readmitted ten months later, still complaining of previous symptoms except that there was relief of her dysmenorrhea. A bilateral salpingectomy and separation of adhesions was done, and the microscopic examination showed perisalpingitis and circulatory disturbances of both tubes. Ten days after operation the patient died of shock and septic peritonitis.

NOTE.—From a review of this history it seems justifiable to conclude that the patient had a salpingitis when the stem was introduced and while there was no acute exacerbation of this condition; if there had been it should be charged against the operator rather than to the operation.

CASE 3.—Mrs. W., aged twenty-seven years, was a private case and the records were incomplete. Complained of dysmenorrhea and sterility, and a diagnosis was made of undeveloped retroverted uterus, with stenosis of the cervix, and laparotomy advised but refused. Therefore a divulsion, curettage and insertion of a Davenport stem was done. Patient remained in the hospital one week and the temperature ranged from 98° F. to 99.8° F. On the fifteenth day there were severe abdominal pains and the stem was removed. Several weeks later the patient was subjected to a total hysterectomy for pelvic infection.

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CASE 4.—Miss O., aged twenty-seven years. Dysmenorrhea and a diagnosis made of anteflexion and endocervicitis. A divulsion and insertion of a Davenport stem was done and the postoperative temperature was never above 100° F., and the patient was discharged the ninth day, with the following note: "Stem and uterus in good position; no erosion of the cervix; no leucorrhea and adnexæ normal." One month later the patient reported the dysmenorrhea was still present and an examination showed bilateral adnexal disease. Patient treated in the out-patient department, and at the end of a year the leucorrhea and adnexal disease had cleared up, but the dysmenorrhea was unrelieved.

CASE 5.—Mrs. E., aged twenty-four years. Dysmenorrhea and diagnosis of acute anteflexion and infantile uterus and divulsion and insertion of a straight glass stem was done. Highest postoperative temperature 100.8° F. and patient discharged the twelfth day. One week later she had severe uterine pain and the stem was expelled. On examination both lips of the cervix were found bisected and there was tenderness and thickening of both adnexæ. After two months' treatment in the out-patient department the salpingitis cleared up, although the patient complained of pain in the right lower quadrant of the abdomen, and at the end of seven months the patient reported she was relieved of symptoms and that the last menstruation was free of pain.

CASE 6.—Mrs. M., aged twenty-six years. Complained of painful urination and dysmenorrhea, and a divulsion, curettage and insertion of a Davenport stem was done. No microscopic examination of the curettings was recorded. Highest postoperative temperature 100° F. Six weeks later the dysmenorrhea was unrelieved and there was a considerable amount of leucorrhea and one month still later there was found slight tenderness in the left fornix. Two weeks after this the stem was removed and the only note was that there was a good symptomatic result.

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CASE 7.—Mrs. K., aged twenty years. Primary sterility and diagnosis of anteflexion made and a divulsion, curettage and insertion of a Davenport stem was done. No microscopic examination of the curettings was recorded. Highest postoperative temperature 99.6° F. At the second week the stem was removed as a salpingitis had developed, and fifteen months after operation the patient was still sterile and had adnexal disease.

CASE 8.—Mrs. G., aged twenty-seven years. Dysmenorrhea and primary sterility and diagnosis made of anteflexion and stenosis of the cervix and divulsion, curettage and insertion of a Davenport stem was done. No microscopic examination of the curettings was recorded. The stem was removed the seventh day because of pelvic pain and tenderness. The patient was seen one year after operation and the dysmenorrhea was relieved, but she was still sterile.

6. UTERINE COLIC *(2 Cases of 117, or 1.7 per cent.)*.

Two of the 117 cases which were followed up, or in 1.7 per cent., the stem caused uterine colic, which was not relieved until the stem was removed. These cases may have been mild grades of salpingitis, but they are not so classified, as a review of the following abstracts will show that the pain quickly subsided on removal of the stem and there was no further evidence of tubal involvement.

CASE 1.—Mrs. B., aged thirty years. Dysmenorrhea and primary sterility and a divulsion, curettage and insertion of a curved glass stem was done. Microscopic examination of the curettings showed hyperplasia of the uterine mucosa. Highest postoperative temperature 100.6° F. On the tenth and eleventh days the patient had severe uterine cramps which were not relieved until the twelfth day, when the stem was removed. Fifteen months later the patient reported that the dysmenorrhea was greatly improved, but that she was still sterile.

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CASE 2.—Miss W., aged twenty-eight years. Dysmenorrhea and diagnosis made of anteflexion and left salpingo-oöphoritis. A divulsion, curettage and insertion of a curved glass stem. Salpingo-oöphorectomy and appendectomy was done. Pathologic diagnosis, salpingitis isthmica nordosa simplex. On the ninth day there were severe uterine cramps which ceased when stem was removed. Highest postoperative temperature 100.8°F. Eleven months later the dysmenorrhea was improved but the patient had pulmonary tuberculosis.

II. SEQUELAE OF INTRA-UTERINE STEM AND MINOR OPERATIONS.

There were sequelæ in two cases in which minor operations were done in addition to insertion of the stem. These can hardly be charged to the stem pessary, as there were cutting operations on the cervix or the uterus, and in one of the cases there was a dissection of the vagina. The following are abstracts of these cases:

CASE 1.—Mrs. B., aged twenty-three years. Dysmenorrhea and secondary sterility. A diagnosis was made of anteflexion and a divulsion, curettage, incision of the internal os and an insertion of a curved glass stem was done. Microscopic examination of the curettings showed hyperplastic premenstrual uterine mucosa. The first twenty-four hours the patient complained of severe headache, but the highest temperature was only 100° F. The second day there was severe abdominal pain with tympanitis, which was relieved by an enema. The temperature remained normal until 8 P.M., the beginning of the third day, when it rose to 102° F. and the patient complained of being very nervous and generally uncomfortable. Sponge bath and ice-bag were applied to the abdomen, but in twenty-four hours the temperature was 101° F., and it did not remain normal until the seventh day. During this time the patient complained of abdominal pains and cramps. The seventeenth day the stem was removed, as the suture had cut through the posterior lip of the cervix. No follow-up was possible in this case.

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Case 2.—Mrs. M., aged thirty years. Primary sterility. A diagnosis made of infantile anteflexed uterus and divulsion, curettage, vaginal hysterotomy and insertion of a curved-glass stem was done. Microscopic examination of the curettings showed premenstrual uterine mucosa. In twenty-four hours the temperature rose to 102.8° F., the patient was restless and the abdomen was distended. Symptoms were relieved by an enema, but for another twenty-four hours the temperature was still 102° F. A further study of the case showed the symptoms to be due to a bacillus coli infection of the bladder, and the temperature became normal the fourth day and the patient was discharged on the eighth day. The patient was last heard from thirteen months after operation, and was still sterile.

III. Sequelae of Intra-uterine Stem and Abdominal Operations.

Of the 45 cases on whom abdominal operations were performed, in addition to insertion of the stem pessary, we are able to follow up but 32, or 71.1 per cent., and we find sequelæ in 7, or 21.9 per cent. However, the following review of the operations performed and the sequelæ in four of these cases seem to prove that the intra-abdominal work rather than the insertion of the stem pessary was the cause of the morbidity.

Case 1.—Myomectomy, resection of the left ovary, resection of the right tube, shortening of the round ligaments and ventral suspension. At the end of seventeen months there was found a slight exudate in the right broad ligament.

Case 2.—Right salpingo-oöphorectomy, appendectomy and separation of adhesions. At the fourth month there was found left adnexal disease.

Case 3.—Resection of both ovaries, shortening of the round ligaments and appendectomy. At the third month there was found pelvic pain and sensitive adnexæ.

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CASE 4.—Resection of the left ovary, shortening the round ligaments, ventral suspension and appendectomy. At one month there was left-sided pelvic pain and the left tube and ovary were found enlarged and tender.

In 3 cases, or 9.4 per cent., the insertion of the stem pessary was probably the cause of the sequelæ, as a review of the following abstracts will show:

CASE 1.—Miss K., aged twenty-four years. Dysmenorrhea and a diagnosis made of stenosis of the cervix and retroversion. Divulsion, insertion of a straight glass stem and Alexander's operation was done. No microscopic examination of the curettings was recorded. Highest postoperative temperature, 100.4° F. Two months later the patient complained of left-sided pelvic pain, which was present since operation, and an examination showed the uterus in good position, but the left adnexæ were tender but not enlarged.

CASE 2.—Mrs. M., aged twenty-nine years. Primary sterility and diagnosis made of retroversion and peritoneal adhesions. Divulsion and insertion of a straight glass stem, shortening of the round ligaments, appendectomy and separation of peritoneal adhesions. One month after operation the stem was in good position, but was removed, as both adnexæ were enlarged and tender. One year later the patient was still sterile and both adnexæ were enlarged and tender, and she now also complained of irregular and painful menstruation.

CASE 3. *(Uterine Colic, see Case 2, Division 6.).*

END RESULTS

In our final analysis of end-results we have excluded all cases followed up less than three months and for sterility all cases followed up for less than five months. Thus of the 205 cases we have been able to analyze 117 or 57 per cent. of the

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cases at the Woman's Hospital, in which the stem pessary was used from October 1, 1915, to September 30, 1919. This analysis was possible, in ward cases, by the use of the card index of our follow-up clinic and in private cases through a questionnaire sent to the individual operators. Therefore, we have end-results of insertion of the stem pessary with its accompanying divulsion or divulsion and curettage in 83 of 147 cases, or 56.6 per cent.; combined with minor operations in 2 of 13 cases, or 15.3 per cent.; and combined with major or abdominal operations in 32 of 45 cases, or 71.1 per cent. These cases were under postoperative observation for varying lengths of time, and the following are the percentages for the 117 cases; 54.7 per cent. for three to twelve months; 17.1 per cent. for twelve to twenty-four months; 23.1 per cent. for twenty-four to thirty-six months; and 5.1 per cent. for thirty-six to forty-eight months. The majority of the cases, or 54.7 per cent., who were followed only during the first year after operation, 23.1 per cent. were observed for three to six months; 15.4 per cent. were observed for six to nine months; and 16.2 per cent. were observed for nine to twelve months. Thus while only 45.3 per cent. of the cases were followed up after twelve months it seems that any benefit accruing from the use of the stem should occur before this time and therefore it is fair to determine the status of the intra-uterine stem from the data in hand.

The end-results for private and ward cases have been tabulated separately. For dysmenorrhea we have recorded the findings as improved and not improved and have subdivided improved into partially relieved and relieved and have calculated the percentages under these subdivisions. (See Tables I and II.) For sterility the findings are recorded as relieved and not relieved with the percentage for the former. (See Tables III and IV.) Further, we have analyzed the results of the use of the stem in cases who did not complain of dysmenorrhea or sterility but in whom an anteflexion of the uterus or a stenosis of the cervix or both seemed to contribute to the symptom-complex. (See Table V.) In Table VI we have

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a summary of the end-results of the use of the intra-uterine stem in 117, or 57 per cent. of 205 cases, which were followed up for three months or longer.

A review of the above statistics gives for dysmenorrhea in 24 private cases, 22 of insertion of stem and 2 of insertion of stem and appendectomy, improvement in 91.7 per cent., with relief in 75 per cent. (See Table I, A.) For dysmenorrhea

TABLE I.—FOLLOW-UP ANALYSIS. DYSMENORRHEA (END-RESULTS FOR THREE MONTHS OR LONGER)

PRIVATE CASES

	No.	Improved.		Not improved.	Relieved, per cent.	Improved, per cent.
		Partially relieved.	Relieved.			
A. Insertion of stem for dysmenorrhea	14	4	8	2	67.1	85.7
Insertion of stem for dysmenorrhea and sterility	8	0	8	0	100.0	100.0
Insertion of stem and appendectomy	2	0	2	0	100.0	100.0
	24	4	18	2	75.0	91.7
B. Insertion of stem, shortening the round ligaments and appendectomy	5	0	5	0	100.0	100.0
Insertion of stem and shortening the round ligaments for dysmenorrhea and sterility	3	0	3	0	100.0	100.0
Insertion of stem and abdominal operations	4	2	1	1	25.0	75.0
	12	2	9	1	75.0	91.7
C. Total private cases	36	6	27	3	75.0	91.7

in 30 ward cases, 29 of insertion of stem and 1 of insertion of stem and appendectomy, improvement in 63.3 per cent. with relief in 46.7 per cent. (See Table II, A.) For primary sterility in 23 private cases, 21 of insertion of stem and 2 with additional operations on the cervix or vagina or both, there was relief in 34.8 per cent. (See Table III, A.) In 12 ward cases of insertion of stem there was relief in only 8.3 per cent. (See Table IV, A.) For secondary sterility the stem was used

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in but 3 cases, 1 private with no relief and 2 ward cases, with 50 per cent. relief. See Tables III, D and IV, D.)

If we go a step farther and analyze the cases on whom in addition the round ligaments were shortened or other intra-abdominal operations were done, we find that in 12 private cases of dysmenorrhea there was improvement in 91.7 per cent.

TABLE II.—FOLLOW-UP ANALYSIS. DYSMENORRHEA (END-RESULTS FOR THREE MONTHS OR LONGER)

WARD CASES

	No.	Improved.		Not improved.	Relieved, per cent.	Improved, per cent.
		Partially relieved.	Relieved			
A. Insertion of stem for dysmenorrhea	28	5	13	10	46.4	64.3
Insertion of stem for dysmenorrhea and sterility	1	0	1	0	100.0	100.0
Insertion of stem and appendectomy	1	0	0	1	0	0
	30	5	14	11	46.7	63.3
B. Insertion of stem, shortening the round ligaments and appendectomy	2	1	1	0	50.0	100.0
Insertion of stem, shortening the round ligaments for dysmenorrhea and sterility	1	0	1	0	100.0	100.0
Insertion of stem and abdominal operations	3	0	1	2	33.3	33.3
	6	1	3	2	50.0	66.7
C. Total ward cases	36	6	17	13	47.2	66.3
D. Total private and ward cases of dysmenorrhea	72	12	44	16	61.1	77.8

and relief in 75 per cent., and 6 ward cases of dysmenorrhea there was improvement in 66.7 per cent. and relief in 50 per cent. (See Tables I, B and II, B.) For 4 private cases of primary sterility there was relief in 25 per cent. and in 4 ward cases, 3 of primary and 1 of secondary, there was no relief. (See Tables III, B and IV, B and D.) Then if we take stock of all cases of dysmenorrhea and sterility in which

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the stem was used we have 36 private cases of dysmenorrhea with improvement in 91.7 per cent. and relief in 75 per cent., while in 36 ward cases of dysmenorrhea there was improvement in only 66.3 per cent. and relief in only 47.2 per cent. Likewise for sterility in 27 private cases of primary there was relief in 33.3 per cent., with 1 case of secondary with no relief, while in 16 ward cases of primary there was relief in only 6.25 per cent. and 3 cases of secondary with 33.3 per cent. (See Tables III, C and IV, C.)

TABLE III.—FOLLOW-UP ANALYSIS. STERILITY (END-RESULTS FOR FIVE MONTHS OR LONGER)

PRIVATE CASES

	No.	Relieved.	Not relieved.	Relieved, per cent.
A. Primary sterility:				
Insertion of stem	14	5	9	35.7
Insertion of stem for sterility and Dysmenorrhea	7	2	5	28.6
Insertion of stem and minor vaginal operations	2	1	1	50.0
	23	8	15	34.8
B. Insertion of the stem and shortening the round ligaments	2	1	1	50.0
Insertion of stem, shortening the round ligaments and appendectomy	2	0	2	0
	4	1	3	25.0
C. Total private cases of primary sterility	27	9	18	33.3
D. Secondary sterility:				
Insertion of stem	1	0	1	0
	1	0	1	0
E. Total private cases of primary and secondary sterility	28	9	19	32.1

The higher percentages of successful results in the private cases when compared to the ward cases seem to be due to a more careful study and selection of the former. This seems to be borne out by the fact that 66.6 per cent. of the sequelæ occurred in the ward cases. Thus the failure to obtain results

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by the use of the stem or the deplorable sequelæ following its use should be more often blamed on the operator rather than the operation.

TABLE IV.—FOLLOW-UP ANALYSIS. STERILITY (END-RESULTS FOR FIVE MONTHS OR LONGER)

WARD CASES

	No.	Relieved.	Not relieved.	Relieved, per cent.
A. Primary sterility:				
Insertion of stem	9	1	8	11.1
Insertion of stem for sterility and dysmenorrhea	3	0	3	0
	12	1	11	8.3
B. Insertion of stem and shortening the round ligaments	3	0	3	0
Insertion of stem, shortening the round ligaments and appendectomy	1	0	1	0
	4	0	4	0
C. Total ward cases of primary sterility	16	1	15	6.25
D. Secondary sterility:				
Insertion of stem	2	1	1	50.0
Insertion of stem and abdominal operation	1	0	0	0
	3	1	1	33.3
E. Total ward cases of primary and secondary sterility	19	2	16	10.5

SUMMARY OF FOLLOW-UP ANALYSIS

If we combine the end-results for private and ward cases we find in 72 cases of dysmenorrhea there was improvement in 77.8 per cent., with relief in 61.1 per cent., and in 47 cases of sterility there was relief in 23.4 per cent. (See Table VI, A and B.) And if in addition we include the 8 cases in which the stem was used for symptoms other than dysmenorrhea or sterility, but in whom an anteflexion of the uterus or a stenosis of the cervix seemed to contribute to the symptom-complex there was improvement in 55.9 per cent. with relief in 45.7 per cent. (See Table VI.)

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TABLE V.—FOLLOW-UP ANALYSIS. SYMPTOMS OTHER THAN DYSMENORRHEA AND STERILITY WITH ANTEFLEXION OR STENOSIS CONTRIBUTING TO THE SYMPTOM-COMPLEX (END-RESULTS FOR THREE MONTHS OR LONGER)

	No.	Improved.		Not improved.	Relieved, per cent.	Improved, per cent.
		Partially relieved.	Relieved.			
Insertion of stem	5	1	1	4	20.0	40.0
Insertion of stem and abdominal operation	3	0	2	1	66.6	66.6
	8	1	3	5	37.5	50.0

TABLE VI.—SUMMARY OF FOLLOW-UP ANALYSIS

	No.	Improved.		Not improved.	Relieved, per cent.	Improved, per cent.
		Partially relieved.	Relieved.			
A. Total private and ward cases treated for dysmenorrhea	72	12	44	16	61.1	77.8
B. Total private and ward cases treated for sterility	47	..	11	36	23.4	
C. Total cases treated for conditions other than dysmenorrhea or sterility	8	1	3	5	37.5	50.0
	127*	13	58	57	45.7	55.9

* Only 117 patients were followed up, but 10 were treated for both dysmenorrhea and sterility and have been analyzed under both of these headings.

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TABLE VII.—STATISTICS FROM THE LITERATURE OF THE OPERATIVE RESULTS FOR DYSMENORRHEA AND STERILITY

Results reported by	No.	Dysmenorrhea relieved, per cent.	Sterility relieved, per cent.	Remarks.
A. For D and C:				
Holden (2)	95	60.0	15.0	
Rongy (3)	4	?	25.0	
Norris and Barnard (4)	28	78.5	?	
For Possi operation:				
Possi (5)	?	75.0	25.0	
For Dudley operation:				
Dudley (6)	100	75.0	42.8	7 cases of prolonged sterility; 3 relieved.
Wardsworth (7)	37	72.9	?	
Rongy	11	?	27.7	
Goldenberg (8)	9	77.7	33.3	
Brickner (9)	73	64.3	27.0	For ward cases: dysmenorrhea, 55.1 per cent.; sterility, 17.2 per cent. For private cases: dysmenorrhea, 84.6 per cent.; sterility, 42.1 per cent.
Combined operations:				
Holden, F. R. (10)	..	85.0	25.0	Dudley-Reynolds operation.
Wardsworth	33	78.7	30.7	Dudley and Sterile, 13; relieved, 4; anterior wall operation, 18; oöphrectomy, 3; Alexander's operation, 1; ventral suspension, 1; appendix and ovary, 1; myomectomy, 1.
Norris and Barnard	40	?	35.7	D and C, 28; D and C and Wylie stem, 9; Dudley and Wylie stem, 4; Dudley, 1.
Rongy	36	?	30.5	D and C, 4; Dudley, 11; stems, 18; high amputation of cervix, 3.
B. For intra-uterine stems:				
Davenport (12)	200	?	25.0	
Wylie (11)	?	80.0	?	
Beyea (13)	41	80–85	33.3	
Rongy	18	?	33.3	
Norris and Barnard	9	77.7	?	
Norris (14)	35	?	38.57	
Dickinson and Smith(15)	15	..	62.5	
Dickinson and Smith(15)	7	71.4		
Townsend (16)	80	95.0		
Townsend (16)	23	..	73.9	
Watkins (17)	31	48.38	..	Tents and stems.

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In a paper read before the New York Obstetrical Society in 1913 the author (1) presented the available statistics of the operative result for dysmenorrhea and sterility. To these others are added, and a review of Table VII gives for preparations other than insertion of stem a relief of dysmenorrhea in from 60 to 85 per cent. with an average of 74.1 per cent., and for sterility a relief of from 15 to 42.8 per cent., an average of 28.88 per cent. For insertion of the stem a relief of dysmenorrhea in from 48.38 to 95 per cent. an average of 76.25 per cent., and for sterility a relief of from 25 to 73.9 per cent., an average of 44.43 per cent. Further, it is of interest to note that Brickner, in his series of Dudley operations, obtained as we did in our series of stems a higher percentage of relief in the private cases.

While we all recognize the unreliability of statistics they are not more misleading in one method of operative procedure than in the other, and as our end-results by comparison with other published results seem to be conservative, it would seem that we were justified in making conclusions from the above study as to the status of the intra-uterine stem, as follows.

Conclusions

1. The intra-uterine stem pessary has a limited field of usefulness in gynecology. It is applicable in 51.7 per cent. of patients suffering from either dysmenorrhea, sterility, amenorrhea, anteflexion of the uterus, stenosis of the cervix or congenital malformation of the uterus. As an operative measure it is applicable to 2.3 per cent. of patients treated and 1.3 per cent. of operations performed in a gynecologic hospital.

2. From its use sequelæ, other than a temporary rise of temperature, occur in from 17.6 per cent. to 21.8 per cent. of the cases, with a permanent morbidity of from 5.8 to 9.8 per cent.

3. As a therapeutic measure for dysmenorrhea there is improvement in 77.8 per cent. with relief in 61.1 per cent. and for sterility there is relief in 23.4 per cent.

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4. The intra-uterine stem pessary gives as good end-results as other operative procedures for like indications, and from its use there is less primary invalidism and no more liability to sequelæ or morbidity.

5. The intra-uterine stem should never be used except in carefully studied and selected cases, and only then will the minimum of sequelæ and morbidity, with the maximum of results, be obtained as evidenced by the private cases of our series.

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INDICATIONS FOR OPERATION IN SPREADING PERITONITIS OF POSTABORTAL AND POSTPARTAL ORIGIN

By John Osborn Polak, M.D.,
Brooklyn, N. Y.

(Read by Title)

Postpartal and postabortal peritonitis originate in the pelvis from the inoculation by infective organisms of wounds in the genital tract or by extension of endometrial inflammations along the tubes and parametrium to the pelvic peritoneum.

Because of the peculiar anatomy and lymphatic distribution of the female pelvis the infection usually remains confined to the serous coats of the pelvic structures and the parietal peritoneum.

From an extended study of the autopsy findings in patients dying from postabortal and puerperal conditions, as well as from many observations made at the operating table in cases of postpartal and postabortal inflammation, we have been impressed with the anatomic isolation of the pelvis which generally obtains and which is favored by the routine employment of the elevated trunk posture of Fowler, which has become so universal in the conservative treatment of pelvic infection.

The similarity of the anatomic findings has been constant in every case in which the uterine fundus did not reach out of

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the pelvis beyond the confines of the loop of the sigmoid. It mattered not whether the inflammatory reaction was confined to the true pelvis or had extended upward into the general cavity. Nature's attempt at isolation was always present, varying only in its completeness. Peritonitis of postabortal or gonorrheal origin generally remains confined to the pelvis, unless the infecting bacteria are particularly virulent, or the tissue resistance is low, or unless Nature's plan of isolation is disturbed by meddlesome manipulation on the part of the attendant.

There are several reasons why this pelvic localization of the inflammatory process takes place: (1) Because the infection reaches the peritoneum through either the tubes or parametrium and consequently the peritoneal reaction is either due to the leakage from the abdominal ostium of the tube or the exudative infiltration which takes place through the serous coat of the tube or of the parametrium. The tubes through which much of the infective material escapes, because of their increased weight, early drop into the cul-de-sac of Douglas, and therefore deposit their infective material and exudate low in the pelvis, and necessarily the most active peritoneal reaction is at or near this point. (2) The peritoneal reaction usually remains localized when the uterus is within the confines of the pelvis, for the sigmoid falls over the infected area and becomes adherent to the uterus, bladder, fundus and parietal peritoneum, thus isolating the infected pelvis from the general cavity.

On the other hand, in puerperal peritonitis the primary seat of the infection is in the uterine endometrium, which in turn is drained by the uterine and parametritic lymph channels. These pass along through the uterine wall to the perimetrium or in the cellular tissue of the broad ligament and excite a parametritic reaction and empty into the iliac and lumbar glands. If the infecting organism is virulent but little local reaction is produced and the infection rapidly reaches the peritoneum; but when a parametritis is excited there is a subperitoneal edema of the overlying serous coat; this distorts

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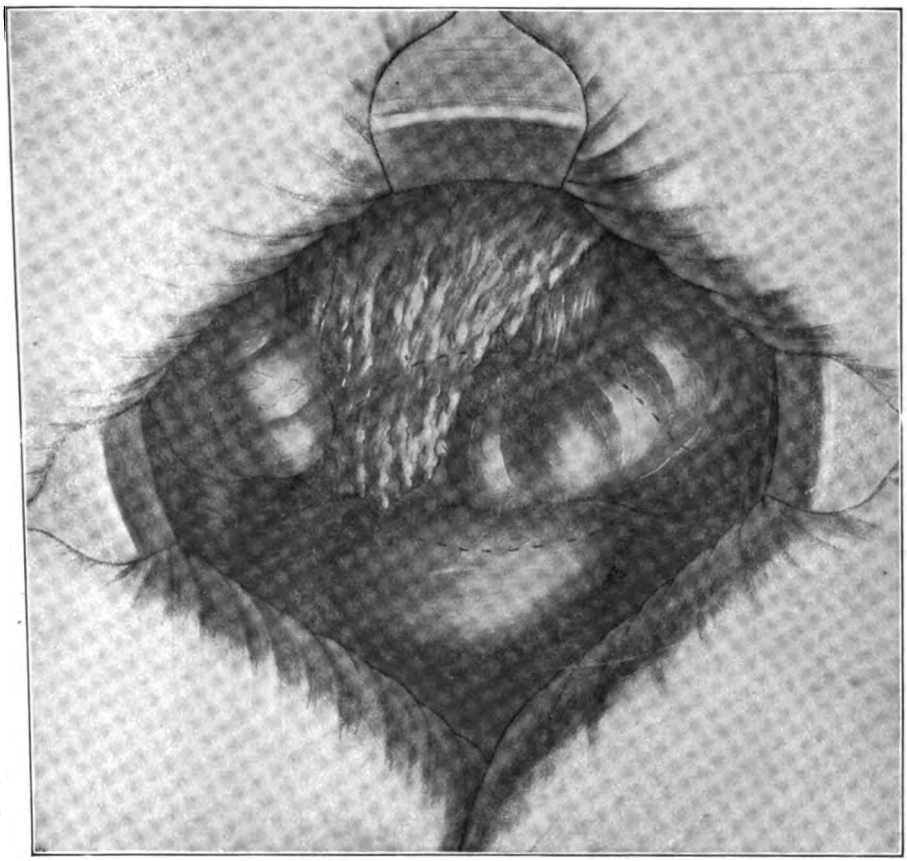

FIG. 1.[1]—View of viscera through abdominal incision, showing isolation of the pelvis by inflammatory adhesion of the sigmoid, omentum and cecum to the fundus of the bladder.

[1] Illustrations in this paper are from "Pelvic Inflammation in Women," by John Osborne Polak, M.D. (D. Appleton & Co., New York, N. Y., 1921.)

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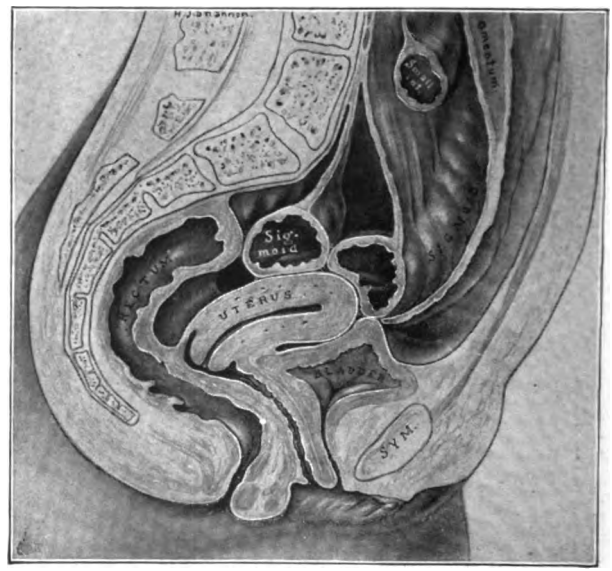

FIG. 2.—Schematic sagittal section showing relations in Fig. 1.

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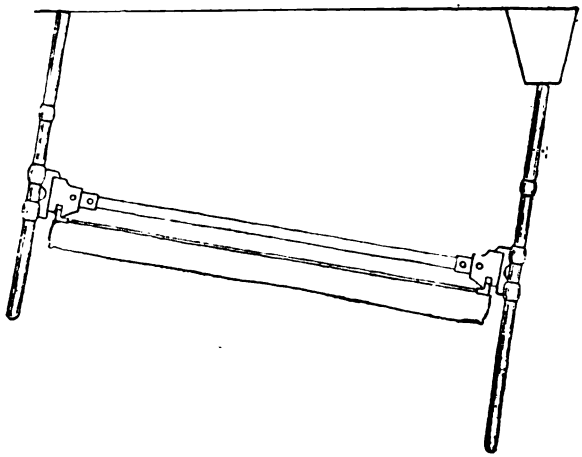

FIG. 3.—Elevated trunk posture, using the ordinary bed.

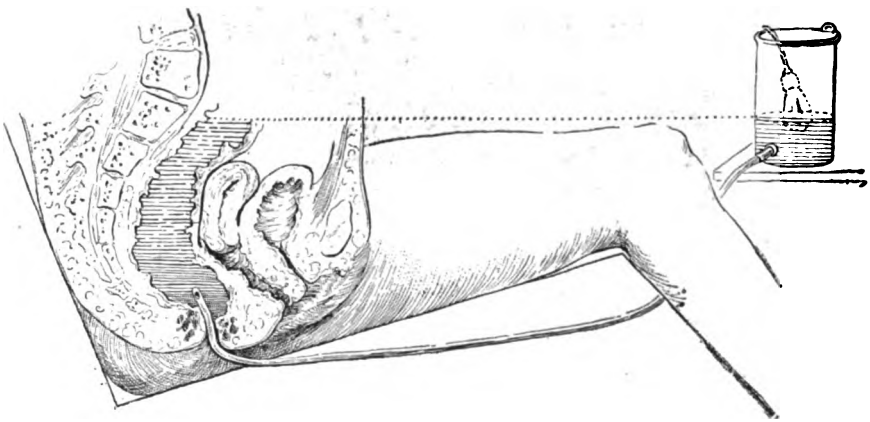

FIG. 4.—Harris drip with patient in Gatch frame showing level of fluid in reservoir and sigmoid.

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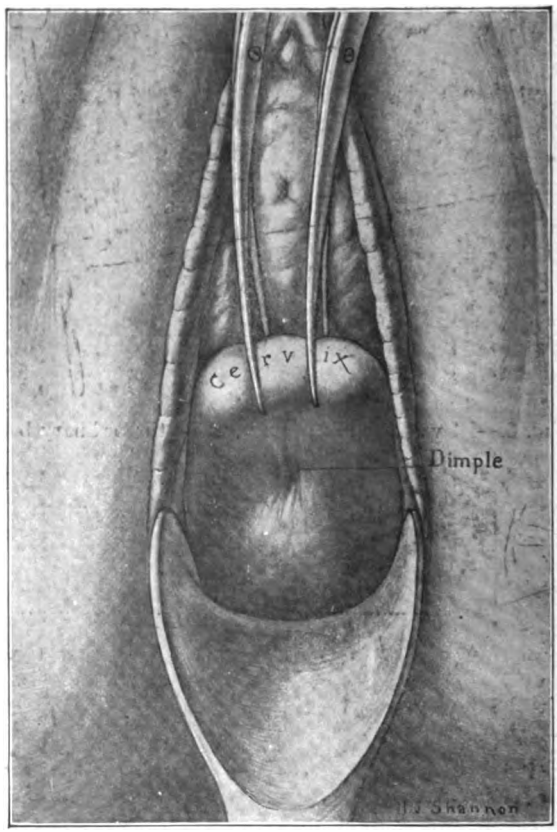

FIG. 5.—Technic of posterior vaginal section. Cervix drawn forward with tenacula, showing dimple at point of incision.

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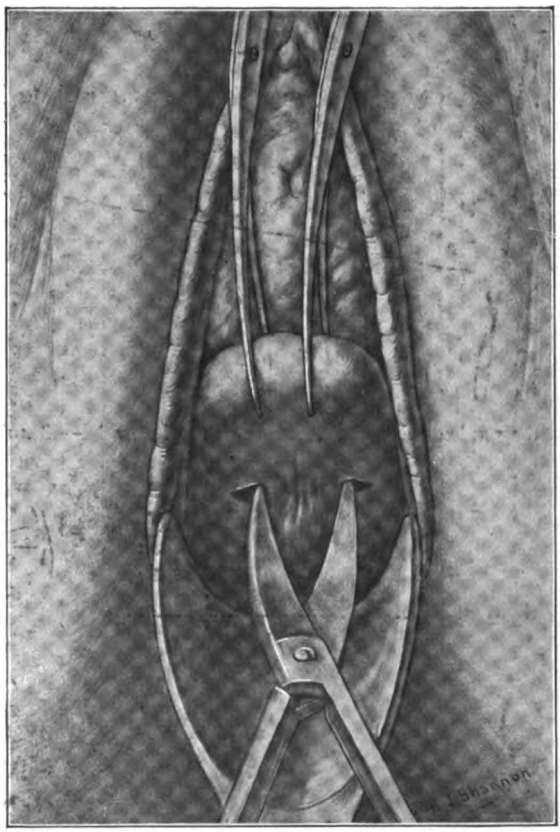

FIG. 6.—Posterior vaginal section, showing incision through the mucosa.

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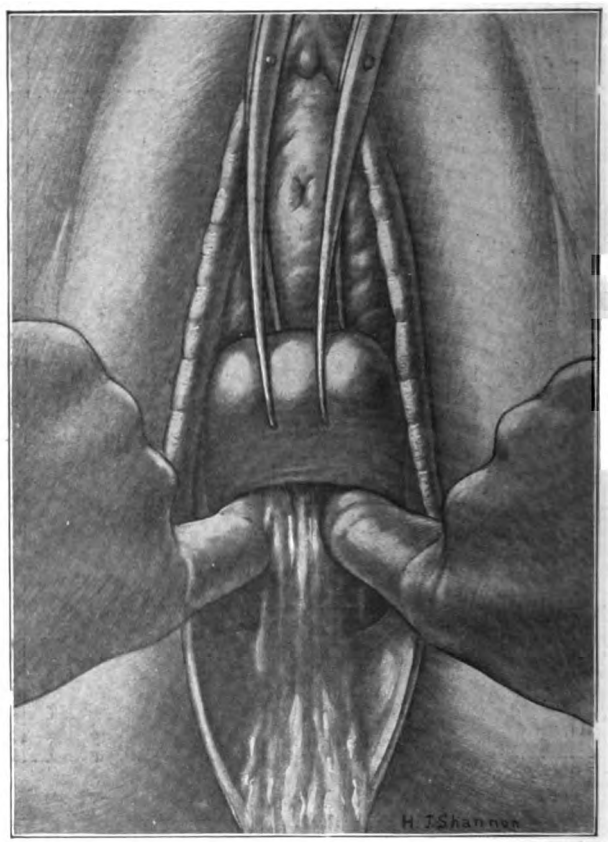

FIG. 7.—Colpotomy incision widened by fingers.

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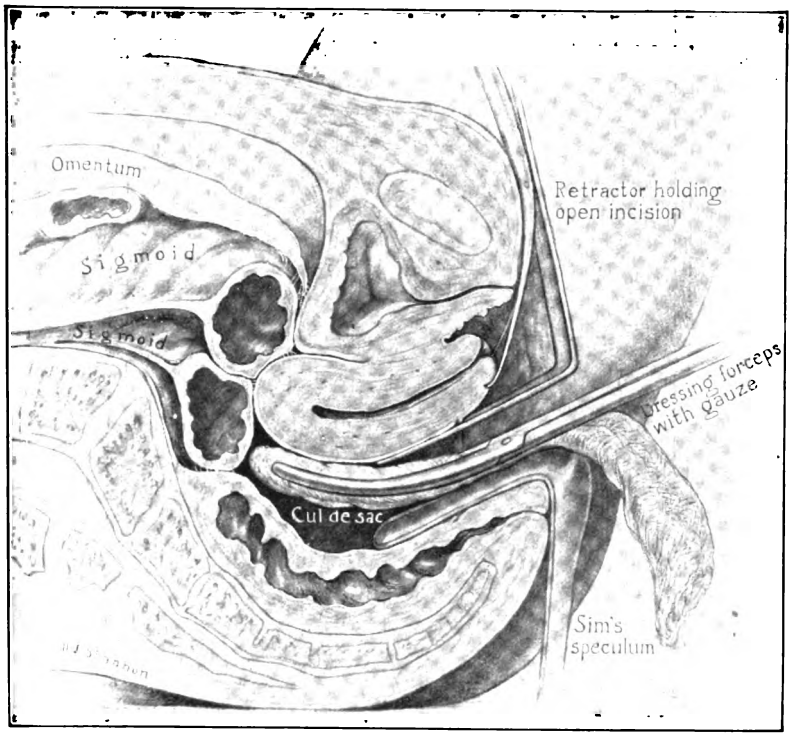

FIG. 8.—Schematic section of pelvis showing introduction of gauze into cul-de-sac between two retractors.

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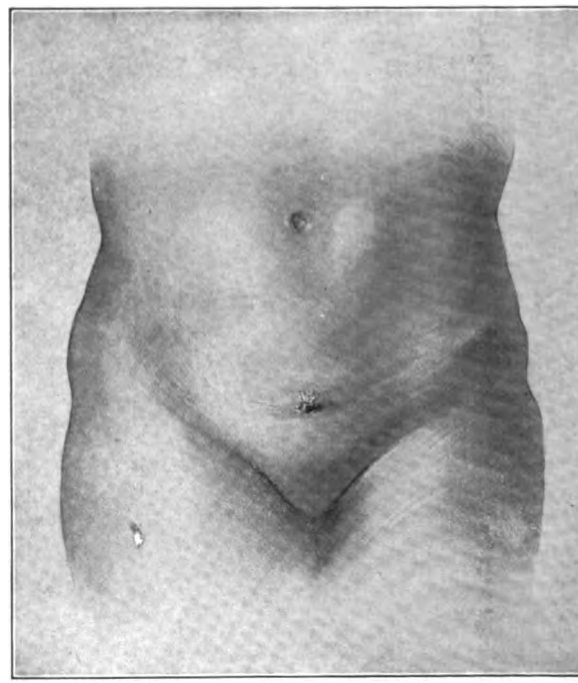

FIG. 9.—Showing site of suprapubic stab-wound drainage.

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and displaces the peritoneal endothelium and allows the inflammatory exudate to be poured out between the cells onto the peritoneal surface. These surfaces, owing to the high position and the size of the puerperal uterus, come in contact with intestinal coils, and, furthermore, the pelvic brim is blocked by the ball-valve action of the enlarged uterus and gravity drainage is interfered with. Hence, instead of the exudate, as it is poured out, gravitating downward into the true pelvis, it is poured out into the spaces between the intestinal coils forming adhesions; or if the exudate is virulent, ascending into the general cavity. Therefore it will be seen that there is a distinct difference in the pathology in postabortal and gonorrheal peritonitis, with the uterus well within the confines of the pelvic brim, and the pathologic changes which may take place in the peritonitis complicating the puerperal state. Ordinarily, when the infection reaches the peritoneum, a tissue reaction takes place in this structure and a plastic exudate is poured out. This usually seals off the general cavity from the infected area by the formation of adhesions with the adjacent viscera. During this reaction there is always an elevation of temperature and an acceleration of the pulse-rate, a leukocytosis, and a relative increase in the polymorphonuclear percentage, abdominal distention, abdominal tenderness and local tension directly over the inflamed area.

Under proper treatment, such as the Fowler posture, an ice-bag over the abdomen, morphin and proctoclysis, the general symptoms gradually subside unless the pelvic isolation is incomplete, as is the case when the puerperal uterus, with its perimetric exudate, is well out of the true pelvis or the bacterial invasion is so overpowering as to overcome the leukocytic and plastic reaction, in which case, instead of the abdominal symptoms subsiding, evidences of extension become apparent. This is manifested by an increase in the abdominal pain due to peritoneal reaction and increased intestinal peristalsis, and an increase in the area of abdominal tension and distention. There is also an increase or a persistence of the temperature

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reaction and an increase in the rapidity of the pulse-rate; but far more important than these clinical evidences of extension is the increase in the polymorphonuclear percentage. This is always increased in spreading peritonitis no matter how high the leukocytosis may be.

When this symptom-complex, namely, the increase in abdominal pain, tension, distention and polymorphonuclear percentage, is present, conservative treatment should cease and drainage should be promptly established. Whether this drainage should be made through the cul-de-sac of Douglas or through a stab-wound incision has to be determined by the type of case with which we are dealing.

In the postabortive and gonococcic type, free cul-de-sac incision usually results in the escape of thin, cloudy, blood-stained serum; for when the uterus is not sufficiently enlarged to block the pelvic brim the Fowler posture will allow this virulent exudate to gravitate into the lowermost part of the peritoneal sac, namely, the cul-de-sac of Douglas, and consequently free cul-de-sac drainage will relieve the patient from the absorption of the toxins by the lymphatics of the peritoneum. Such drainage is usually sufficient to give Nature the necessary assistance in isolating the pelvis from the general peritoneal cavity. In other words, in a spreading peritonitis of this type, by early cul-de-sac drainage, we are able to change what is becoming a general involvement into a local pelvic peritonitis or pelvic abscess.

On the other hand, in puerperal peritonitis, with these same evidences of extension, if the pelvic brim is blocked by the ball-valve action of the large puerperal uterus, cul-de-sac drainage does not offer the same advantages. While we have felt for years that but relatively few puerperal deaths were due to peritonitis, yet there are a sufficient number of these severe infections in which the peritoneum is involved in which there is a distinct place for the employment of the surgical principles of drainage.

The expectant treatment of puerperal peritonitis has such a high mortality, owing to the peculiar physiologic and

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anatomic changes which take place in the blood and lymph channels during the pregnant state, that the absorption of toxins and the resulting toxemia, both from within and without the intestines, play havoc with the individual resistance and deprive the patient of nourishment, fluid and oxygen, and so poison the heart muscle that the blood-pressure falls and there is a general disfunction of the emunctaries, consequently any procedure which offers an improvement in our results should be tried with courage and conviction. During the past two years we have treated 12 cases of spreading peritonitis of postabortal and puerperal origin with abdominal drainage. In the first 2 we were not sufficiently clear as to our indications and the drainage was resorted to rather later than in our subsequent cases. One of these patients died. In the next 10, where the significance of the symptom-complex already referred to was more fully appreciated, drainage was promptly established on the demonstration of the high polymorphonuclear percentage, 6 recovered, 4 died. This gives us a total recovery of seven out of 12 cases treated, which is certainly more encouraging than that of any previous method of treatment.

Our general plan of management of these cases has been as follows: On admission to the hospital, after a careful history has been taken, which always suggests the origin and course of the infection, the patient has a detailed physical examination, which includes inspection of her general appearance, tongue, peripheral circulation and abdominal contour. The heart and lungs are next interrogated and the blood-pressure and pulse-pressure taken. The abdomen is next palpated to determine the degree of distention, tension and local areas of tenderness. A complete blood count is made and blood for blood culture abstracted. The patient is then placed in the high Fowler position, one or more ice-bags applied to the abdomen and a proctoclysis by the Harris method of a glucose-bicarbonate solution begun. The pain is relieved by routine morphinization, small doses being given hypodermically at regular intervals, and the pulse, tempera-

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ture, respiration, leukocyte count and polymorphonuclear percentage recorded. If the patient's resistance is capable of taking care of the peritoneal invasion, in twelve to twenty hours there will be a definite recession in the severity of the symptoms and a fall in the polymorphonuclear percentage.

On the other hand, if her resistance is insufficient or the virulence of the invading organisms greater than the protective reaction, the pulse, temperature and local abdominal symptoms will remain stationary or increase in severity, and, most important of all, the polymorphonuclear percentage will rise. In the presence of these conditions drainage is imperative, one does not need to find a palpable exudate in the cul-de-sac before making a posterior vaginal incision through the fornix. Such an incision in the presence of the symptom-complex, such as already described in postabortal cases, will usually be rewarded by the liberation of a pint or more of thin, flocculent, blood-stained serum, which on culture returns numberless streptococci.

This is also the case if the uterus is reasonably well involuted and within the confines of the pelvis; but if the uterus is large, extending beyond the pelvic brim, stab-wound abdominal drainage, just above the pubis and the introduction of a tube or cigarette drain behind the uterus, which is brought out through the abdominal incision with stab-wound incision and drainage in both loins, just external to the ascending and descending colon, will frequently give prompt relief by the release of the peritoneal exudate.

After these incisions have been made the usual treatment of peritonitis, namely: posture, proctoclysis, starvation, lavage and intestinal rest by morphinization, must be continued until the tension is relieved; the intestinal distention subsides, normal peristalsis is established and the temperature, pulse and polymorphonuclear percentage fall.

When this has been accomplished our drainage has succeeded, and not until these clinical evidences are apparent should any food or nourishment be allowed by the stomach.

From our observations in the clinical study of postabortal

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and puerperal peritonitis we have drawn the following conclusions: (1) that nature is competent to localize the lesions in the large majority of peritoneal extensions; (2) that advancing peritonitis has a definite symptom-complex which is constant when the inflammation is spreading; (3) that in the presence of the symptom-complex drainage is necessary and definitely lowers the mortality.

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THE TREATMENT OF PREGNANCY AND LABOR COMPLICATED BY CARDIAC DISEASE

By Franklin S. Newell, M.D.,
Boston, Mass.

(Read by Title)

As far as can be determined from statistics, approximately 2 per cent. of all obstetric cases are complicated by definite valvular disease of the heart, more or less serious in degree, which renders the prognosis somewhat doubtful, either in the immediate pregnancy or in the years to come. When the patients who are suffering from myocardial change, whether acute—following some recent infectious process—or chronic, are included it seems fair to assume that about 3 per cent. of all parturient women have a cardiac condition which may be expected to react more or less seriously to the strain which pregnancy and labor impose on the heart. There is probably no obstetric complication which calls for greater judgment on the part of the attendant than do cardiac lesions, since not only the immediate prognosis for mother and child but the future health of the mother depends on the proper conduct of pregnancy and labor.

The obstetrician is not infrequently called on to decide whether the risks of pregnancy and labor are too great to be undertaken by a patient who is known to have a heart lesion or whether pregnancy may be undertaken with a reasonable chance for an immediately successful outcome for both mother and child and without serious danger that the mother may be left a cardiac invalid at an early date. More commonly, however, he is consulted when the pregnancy is already an established fact, and the question to be answered then is whether the pregancy must be terminated at an early date for the sake of saving the life or health of the mother or be allowed to

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continue, in the absence of serious symptoms to, or nearly to, full term. If he decides, after due consideration, that it is unwise to allow the pregnancy to go on, the method to be adopted for the termination of pregnancy has an important bearing on the future life and health of the patient, and in the cases in which the continuance of pregnancy seems justifiable, the care given the patient during pregnancy and the method of delivery at term have an important bearing not only on the immediate life of the patient but also on her future. The decision of the obstetrician in the individual case is evidently, therefore, not a simple matter, since an error of judgment may involve the loss of the maternal life or health or result in forbidding childbearing needlessly to a woman who would gladly run some risks for the sake of having a child if there is any method of treatment by which the risks can be so minimized as to be justifiable.

The cardiac patient who attempts pregnancy must be considered as a relatively unfavorable risk, even under the best conditions, because some cardiac damage is inevitable, since the cardiac reserve will be depleted to some extent by the additional strain imposed on the heart, and the pregnancy must be so conducted as to give the best chance for a favorable result for both patients, while delivery must be so accomplished as to impose the least possible strain on the damaged heart. It is not enough for the obstetrician to take into account a successful result in the immediate pregnancy, but he must bear in mind the fact that the strain of pregnancy is a serious one and that his patient's future health depends largely on the care which she receives. He must, therefore, take into consideration the effect which the strain of pregnancy and labor will have on the damaged heart in the years to come as well as at the present time, and so conduct the case that the cardiac reserve shall be depleted to the least possible extent.

Before considering the methods to be adopted in the care of the individual case certain facts must be accepted as true if the patient is to be given the best chance for a favorable result.

1. No matter what the nature of the cardiac lesion in the given case, the increased strain which pregnancy and labor unavoidably impose on the damaged heart must diminish, to a certain extent, the

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cardiac reserve and thus to a greater or less degree shorten the patient's life. The damage may be such as to result in death or chronic invalidism unless the pregnancy is terminated early and the child sacrificed, or it may be slight in degree and only become evident as the patient grows older; but in my opinion every patient with a cardiac lesion who attempts childbearing must pay some price in length of days for each child, the exact amount being dependent on the nature of the cardiac lesion, the condition of the heart muscle at the beginning of pregnancy and the efficiency with which the heart is protected from all unnecessary strain during pregnancy and at the time of labor.

2. It is impossible to estimate accurately the extent of the damage which will result to the given heart from the strain of pregnancy, even under the best conditions, in spite of the most careful consideration of all the factors present in the individual case. My experience has shown that in two patients with an apparently equal degree of cardiac damage, which seems to be perfectly compensated under normal conditions, one will develop more or less serious symptoms during pregnancy and labor while the other will pass through the strain without developing any unfavorable symptoms. I believe that there are no accurate means of determining the effect of the pregnancy on the given heart, and that, therefore, it is exceedingly difficult to formulate an accurate prognosis for the given case. I can recall several instances in which the results, both good and bad, have proved so widely at variance with the opinions expressed by competent internists after careful study of the patient that I am convinced that the only fair prognosis which can be given to a cardiac patient is that more or less damage to the heart will result from the attempt to have children and that her life will be shortened to some extent, but that the actual degree of damage in the individual case cannot be estimated in advance. There are, of course, certain patients in whom the cardiac history, taken in conjunction with the physical findings, is such that it is evident that childbearing will either prove fatal or leave the patient a chronic invalid, and in these cases pregnancy should either be forbidden, if the obstetrician is consulted in advance, or should be interfered with promptly as soon as the facts are clearly appreciated.

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In the majority of cases, however, a patient, if otherwise in good health, without a history of previous decompensation and whose heart muscle is presumably sound, can be advised that in all probability pregnancy can be undertaken, under proper supervision, with an excellent chance of an immediately successful result, but that the strain on the heart will cause some damage which will ultimately shorten her life, though to what extent it is impossible to predict accurately, and that it is, therefore, a question for the patient to decide herself whether she is willing to pay an indefinite price for the sake of having children, the exact amount being largely determined by the care with which pregnancy and labor are conducted. There is always, however, an element of uncertainty, and relatively favorable cases, even under competent supervision, sometimes go badly.

It has been a long-established tradition of the medical profession that if a patient with a cardiac lesion consults her physician as to the advisability of pregnancy she should be strongly advised against it. If the only problem to be determined in the given case were the prolongation of the patient's life to the utmost extent, this advice would be sound, since there can be no question but that the avoidance of all possible strain on the heart will do more to conserve its reserve than any other method of treatment. There are, however, many women with cardiac lesions who feel that life is incomplete unless they have children, and who, while not willing to sacrifice their life or immediate health to gratify this desire, are perfectly willing to shorten their lives to a greater or less extent, and in advising these cases as to the justifiability of attempting pregancy, the judgment of the obstetrician is often taxed to the utmost. The nature of the lesion, the history of the patient as regards symptoms of previous decompensation, the probable condition of the heart muscle and the care which the patient is able and willing to receive, both during pregnancy and at the time of labor, must all receive due consideration before proper advice can be given to the individual patient.

Experience has shown that certain lesions are more seriously affected by pregnancy than others. Of these mitral stenosis, either alone or in combination with other lesions, is distinctly the most

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serious. The aortic lesions come next in order, and mitral regurgitation, while not entirely negligible, is of relatively minor importance. If myocarditis can be demonstrated the seriousness of the prognosis is definitely increased. If a patient has never had any signs of decompensation, either in her ordinary life or in previous pregnancies, and has suffered no limitation of her ordinary activities on account of the cardiac lesion, the outlook for a successful pregnancy with a minimum of damage is good. If, however, there have been previous attacks of decompensation, or if the patient develops symptoms referable to the heart on what would be ordinary exertion for the healthy woman, the prognosis is to say the least doubtful and pregnancy should be advised against, irrespective of the nature of the lesion. If a patient's circumstances are such, other conditions being satisfactory, that she can take proper care of herself during pregnancy in order to minimize the damage to the heart and can command such obstetric skill at the time of labor as to save the heart from undue strain, pregnancy is often justifiable, whereas if the opposite were the case pregnancy should be absolutely forbidden. Furthermore, each patient must be informed that if cardiac symptoms unexpectedly arise during pregnancy in spite of careful supervision a prompt termination of the pregnancy will probably be necessary, even in apparently favorable cases, and that under such circumstances a sufficient degree of cardiac damage may result to render her a cardiac invalid to a greater or less extent, even though the pregnancy be ended in the early months. Under these conditions it is fair to advise a cardiac patient that it is justifiable for her to attempt childbearing, but otherwise it should be absolutely forbidden.

In most cases, however, pregnancy is already a fact when the patient consults her physician for care, and the problems which he has to decide are (1) whether a continuance of the pregnancy is justifiable, and if not, by what means is it best terminated; (2) if continuance of the pregnancy seems wise, what routine shall the patient adopt to minimize the strain of pregnancy on the heart; (3) how shall she best be delivered if pregnancy is successfully accomplished?

The question as to whether the pregnancy should be allowed to

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continue or must be terminated probably depends on several factors. Some authorities go so far as to say that the discovery of a mitral stenosis is sufficient indication for immediate abortion, while others feel that heart disease is not a contra-indication for pregnancy and labor. Neither position is correct, as is evidenced by the fact that many patients with a marked mitral stenosis or an aortic lesion go through pregnancy with little apparent damage and regain their ordinary health after delivery, while, on the other hand, in a certain proportion of cases cardiac decompensation develops, which sometimes results in death or invalidism even though the patient is given the best possible care. It is evident, therefore, that the problem is one which must be settled for each individual patient, and no rule can be laid down.

If a patient with mitral stenosis or aortic disease has never had symptoms referable to the heart (at least of a severe character) and the heart is performing its work properly when the patient applies for advice, such a patient should be placed on a definite routine, the purpose of which is to remove all possible strain from the heart, and the pregnancy should be allowed to go on under close observation, interference being only advisable in case symptoms develop. This is particularly true in patients who have had the cardiac lesion for a considerable period of time and have suffered no disability from it. If, however, the patient when under proper supervision has suffered attacks of decompensation; if, when she applies for care, the heart is already causing symptoms; or if her normal activities have in the past been seriously hampered on account of the heart, a patient should be advised that it is unwise to allow the pregnancy to go on, since a serious failure of compensation may develop at any time with possibly fatal results.

If abortion seems advisable the method of operation is of considerable importance. It seems to me that the termination of the pregnancy is only a partial operation in these cases, since it leaves the patient able to again become pregnant, with the necessity of future abortions, and, therefore, I believe that unless the patient's condition is such as to contra-indicate an abdominal operation, the abortion is best accomplished by abdominal hysterotomy, and sterilization should be performed at the same time to obviate the danger of future

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abortions, since the necessity of terminating one pregnancy for cardiac reasons should be considered as an absolute contra-indication to future pregnancies.

I believe it is little if any more dangerous for a patient with a bad heart to be delivered in this way than to have the uterus emptied from below, and the advantage to the patient of being permanently protected against pregnancy, which is considered a serious menace to her life, is considerable. If the patient is suffering from an attack of decompensation at the time when abortion is decided on, every effort should be made to restore compensation before the uterus is emptied. If compensation can be restored the obstetrician has a choice of several methods for emptying the uterus, but I believe that the abdominal route under general anesthesia is the preferable method, irrespective of the period of pregnancy. If, however, it proves impossible to restore satisfactory compensation there is no question in my mind but that delivery by abdominal hysterotomy, under local anesthesia, preceded by morphin and scopolamin, is the most satisfactory method. Such patients are poor risks for any of the general anesthetics and will occasionally die as the result of their use. Paravertebral anesthesia has in my hands proved a very exhausting method to such a patient, although it produces satisfactory anesthesia, and I should hesitate to employ spinal anesthesia on a patient with a decompensated heart on account of the marked changes in blood-pressure which accompany it, though this feeling may not be based on sufficient grounds.

The results which I have had in Cesarean section at term and earlier with local anesthesia, preceded by morphin and scopolamin, have convinced me that this is the most satisfactory method for use in patients whose cardiac condition contra-indicates a general anesthetic, and the operation is as easily performed on a patient three or four months pregnant as at term, being completed by sterilization, the patient being delivered and protected against the dangers of future pregnancies at a single operation.

The employment of the morphin and scopolamin sequence preliminary to operation under local anesthesia has, in my experience, proved most satisfactory, the patient not infrequently having no recollection of the operation. In preparation for the operation the

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patient is given $\frac{1}{6}$ gr. of morphin and 1/200 gr. of scopolamin two hours before the time set for operation, the scopolamin being repeated two or three times at thirty to forty minute intervals until the patient is asleep. The patient's eyes are covered and her ears plugged with cotton before she is brought to the operating room. No unnecessary noise is permitted in the operating room. The abdominal wall is injected with ½ per cent. novocain, it being only necessary to prepare the skin and fascia. Neither the parietal nor visceral peritoneum requires to be anesthetized. An interval of at least ten minutes should elapse between the injection of the novocain and the beginning of the operation. If sterilization is to be performed the uterine portion of the broad ligaments should be anesthetized before the tubes are excised from the uterine cornua. I have found that by strict attention to detail cardiac patients who are often excessively nervous and difficult to control can be brought to operation in a perfectly quiescent state and commonly have no recollection of the operation.

If it is decided that the patient is a fair risk for pregnancy the pregnancy should be allowed to go on under close supervision. All possible strain should be avoided; active exercise, especially hill-climbing should be eliminated as far as possible. The general hygiene, fresh air, diet, etc., should be carefully regulated. The bowels should be kept regular. The urine should be examined at weekly intervals so that any signs of passive congestion may be discovered early. The patient should be instructed to take a two-hour rest in bed every day and to supplement this by spending one day a week in bed during the early part of pregnancy and two days a week during the last three months. The blood-pressure should be carefully followed and a rise in blood-pressure should cause grave concern on account of the extra burden thrown on the heart and may be sufficient to warrant an abortion. Digitalis or other cardiac stimulants are to be used if any signs of failing compensation occur, and may be employed to advantage in all cases in the last months of pregnancy, and the rest periods may be extended if desirable.

If patients are thus kept under close supervision any signs of cardiac distress will be discovered early and can be met by increased

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precautions in the majority of instances. If, however, the cardiac symptoms do not subside promptly, and especially if they show signs of increase, immediate termination of the pregnancy is called for to limit the cardiac damage. This rule should be an absolute one if the pregnancy is less than six months' duration, since the attempt to prolong the pregnancy for several months, in the hope of obtaining a living child in a patient whose cardiac condition is showing signs of failure under proper care, is almost sure to result disastrously and is not justifiable. In patients six months or more advanced in pregnancy in whom the cardiac symptoms, though definite, are not alarming an attempt may be made to carry along the pregnancy to viability if a sufficiently high value is placed on the child by the mother, so that she is willing to run the risk of serious invalidism for the sake of a living child. The patient must, in these cases, be practically confined to her bed throughout the remainder of the pregnancy, and cardiac stimulants should be used as indicated. Delivery should be accomplished by Cesarean section under general or local anesthesia as soon as the child is believed to be sufficiently developed to live in order to minimize the cardiac damage as far as possible, local anesthesia being the choice if the cardiac symptoms are at all marked, and sterilization to avoid future pregnancies is advisable. Interference is seldom indicated in such cases before the thirty-sixth week unless urgently demanded by the cardiac condition, since so much has already been sacrificed by the mother for the sake of the child that its chances should be guaranteed as far as possible. It must not be forgotten that if the mother suffers from severe decompensation the child frequently dies as a result. Therefore, if the cardiac symptoms appear threatening it is seldom or never justifiable to attempt to prolong the pregnancy for a problematical advantage to the child.

As a general rule in these cases I believe that the abdominal route should be selected irrespective of the time when interference is advised, and that the patient should be sterilized to prevent the possibility of future pregnancies. The choice as to whether the operation should be done under general or under local anesthesia depends on the degree to which compensation can be restored before the operation is performed; but operation under local

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anesthesia may well be applied to all cardiac cases who have developed any signs of decompensation.

The strain on the heart increases as the end of pregnancy approaches, and if we can spare the heart two weeks or more of this increasing burden the prognosis for the patient's future will be better than if she is allowed to go to full term; and in any cardiac condition which has given rise to symptoms, even though compensation has been completely restored, this strain should be lessened as far as the interests of the child permit. In all cases in which a definite decompensation has developed during pregnancy it should be recognized that future pregnancies are absolutely contra-indicated and that the possibility of chronic invalidism in the near future is a definite one at the best, even in the absence of all avoidable strain. Should pregnancy occur again in such cases the danger to life and health is greatly increased and prompt abortion is indicated. For this reason sterilization is advisable.

The pregnancy should be ended by the method which will throw the least possible strain on the heart, which is, in my opinion, Cesarean section, under general or local anesthesia, according to the condition of the heart when operation is considered advisable and the preferences of the individual operator. I believe, firmly, that by this method of treatment the damage can be limited, as far as is possible, by any method, but any failure of compensation during pregnancy means that considerable harm has been done even though compensation may have been restored by treatment, and that the patient's future is doubtful at the best. The more serious the decompensation the worse the outlook for the patient and the earlier will she become a cardiac invalid.

Such patients should be advised that pregnancy should be under no circumstances again attempted, and sterilization at the time of the present delivery should be strongly advised, since by this method only can the possibility of pregnancy be absolutely precluded, and in these cases in whom abortion is indicated in case conception occurs at a later date no chances should be taken.

If the patient goes through the pregnancy without developing any signs of decompensation the method of delivery is of great

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importance and will vary in the individual patients with the nature of the heart lesion, the number of the pregnancy and the estimated difficulty of labor. In primiparæ with mitral stenosis or with an aortic lesion delivery should, in my opinion, be accomplished by Cesarean section, preferably about two weeks before the estimated date of labor, so as to spare the heart the increasing strain of the last weeks of pregnancy. There is no doubt but that in the majority of cases a carefully guarded labor ended by an operative pelvic delivery as soon as the cervix is fully dilated will give immediately satisfactory results; but the strain of labor on the damaged heart will to some extent deplete its reserve, and the future prognosis will be improved if the strain of labor is avoided. In these cases there is no reason for sterilizing the patient unless she requests it, owing to the fact that if she is willing to pay a certain price for one or more other children her experience during this pregnancy warrants her in undertaking the risk. In multiparæ who have had no signs of decompensation during pregnancy or at any other time I believe that a short, first stage labor, delivery to be accomplished by forceps or version as soon as the cervix ceases to be an obstacle, will give nearly as good results; but the length of labor in primiparæ, especially if examination gives any reason to suppose that the labor will be at all a difficult one, will throw such strain on the heart as to render an abdominal delivery the wisest course since labor will ultimately result in unnecessarily shortening the patient's life. It is not a question in my mind of the immediate result but of conserving the cardiac reserve, so as to lessen the possibility of the patient's becoming a cardiac invalid in the years to come as far as possible.

In patients with mitral regurgitation which has never caused any symptoms I believe that the only precaution which is necessary is to avoid the strain of the second stage of labor by prompt delivery as soon as the cervix is fully dilated.

The same principles should be followed in patients who are believed to have myocardial change, although no definite heart lesion can be demonstrated. The condition of the heart muscle is even more important than the question of a valvular lesion, and in patients who are suffering from symptoms suggestive of myocarditis, whether acute or chronic, all possible strain should be taken off the

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heart. This is best accomplished by abdominal delivery at a fixed date, thus avoiding the strain which labor imposes on the heart.

I recognize that this method of treating cardiac patients may be criticized; that it may be said with truth that statistics do not warrant the assumption that young women with cardiac lesions are in so precarious a condition as to warrant such radical methods of treatment. The results obtained in any lying-in hospital, as shown by the records, will apparently prove that the great majority of patients with definite cardiac lesions will pass through pregnancy and labor without serious symptoms, and that it is only in occasional primipara or in the woman who has had repeated pregnancies, perhaps against advice, that immediately serious results occur. I believe, however, that this is a case in which the hospital records only tell a part of the story. It is recognized that some patients with cardiac lesions, previously apparently in good health, either die during pregnancy and labor or are left as cardiac invalids as a result of the strain. In my opinion it is impossible to predict accurately which patients will do well and which will suffer severely as the result of pregnancy. Furthermore, the follow-up system of our lying-in hospitals has not been sufficiently developed to tell us what the future of these patients may be. I have seen a sufficient number of patients who have passed through one or more pregnancies without serious disaster only to become permanently invalided within a few years, to be absolutely convinced that it is part of the duty of the obstetrician to safeguard his patients' future by every means in his power; and I feel that the line of treatment which I have attempted to outline in this paper will do more to safeguard the future health of a patient, and at the same time allow her the joy of one or more children, than any other method of treatment, though, of course, I will admit that the most conservative of all methods of treatment is to forbid pregnancy to every woman who has a cardiac lesion and to advise abortion if pregnancy occurs.

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THE EQUIPMENT, THE ORGANIZATION AND THE SCOPE OF TEACHING IN THE OBSTETRICAL DEPARTMENT OF A MODERN MEDICAL SCHOOL

By Barton Cooke Hirst, M.D.,
Philadelphia

(Read by Title)

It is a noteworthy fact that the revolutionary changes in the teaching and practice of obstetrics in the United States during the past twenty years has received little attention from this Society. In the forty-four volumes of its Transactions, among the many papers presented at the annual meetings I remember but one that dealt with the improved training of young physicians who will be our successors. Has not the Society thus lost an opportunity for leadership which would have added to its prestige and influence?

The trustees of medical schools, advisory committees, State legislatures and boards, naturally turning to the leading national society for advice and information, must have been astounded at its aridity in this field. The writer's endeavor in this communication is to make a tardy amend for the neglect of a question which, it would seem, might have excited interest and received careful consideration long ago.

There are medical schools still undergoing reorganization under private control. Legislatures must give this matter thought in organizing the increasing number of schools supported by the State, the expense of technical education often making private management impracticable. It is in the

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hope of furnishing information for the governing bodies of such institutions, and to give aid and support to the teachers who are ambitious to have their departments as nearly as possible on an ideal basis, that the following propositions are advanced:

In a medical school designed for about 400 students in a four years' course the equipment of an obstetric department which entitles it to a respectable position must consist:

1. Of a hospital of at least 100 beds, with a clinical amphitheater; a separate operating room for septic cases and an isolated space for infected women. The apportionment of beds should exceed that for surgery or medicine, for the average instructive capacity of each case in obstetrics is limited in the majority of instances to one or two students.

2. An ambulatory dispensary for the preliminary study of patients and for the follow-up observation and treatment of all cases after discharge from the hospital. Such a dispensary accumulates in time a large service illustrating all the pathologic sequelæ of parturition, including practically all the diseases of women. It should be equipped with every appliance, including electric, for treating women, and should have a social service department attached to it.

3. An out-patient department, with the necessary personnel of nurses, physicians and social service workers. This department should have a separate ambulatory dispensary. On a basis of about 2000 women cared for in their homes annually an enormous dispensary attendance can be secured of women awaiting delivery, and, by a follow-up system, of women suffering from any of the complications or sequelæ of the process of generation at any stage. This service is a valuable feeder to the central hospital, to which all cases requiring operative or other hospital treatment are referred.

It is evident that such an organization gives the obstetric department an amount of clinical material in all the conditions peculiar to women that no other department can rival or even approach.

What is more important, every therapeutic measure required

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by women can be shown to the student; the preventive treatment of gynecologic affections by the proper management of labor; the relationship of diseases of the pelvic organs to the reproductive function; the effect of operative measures on subsequent childbearing, and *vice versa*. In short, to any intelligent student the necessity is made obvious of a closely correlated study of all the pathologic and physiologic phenomena of the female generative organs; the effect of the former on fecundity and reproduction and the causative relationship of parturition to the vast majority of women's diseases.

Such is the broad view of modern education, contrasting strikingly with the provincial American practice of the past; an obstetric department concerned only with the delivery of women without regard to their future and a misnamed gynecologic department dealing only with a moiety of the subject; busily engaged for the most part in patching up the results of other physicians' bad obstetrics. Such an arrangement was evidently doomed to extinction by modern progress and could no more be revived than we could recall to life the elder Mr. Weller.

The medical pedagogues of America must agree with their confreres in the rest of the world that the scope of obstetric teaching embraces not only the physiology and pathology of reproduction but necessarily all the diseases of women. The chief of an obstetric department must be a thoroughly trained abdominal and pelvic surgeon, maintaining proficiency in his art by constant practice. Otherwise he is not fit for his position and would be incompetent to deal with the cases that may be admitted to his clinic at any moment; ruptured uterus with injury of intestines, requiring resection; diaphragmatic hernia in pregnancy; discovery of disease of the gall-bladder in the course of an abdominal operation, and so on through a long list.

In brief, he must be prepared to deal surgically or otherwise with all the ills of women whether complicating pregnancy, labor and the puerperium or often their direct consequence.

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We have in the University of Pennsylvania a voluntary and a compulsory students' interneship in the maternity; the amount of material he sees, the notes he takes and his conduct on the service are collated to establish his rating in the final examination.

I find this record of a student's clinical opportunities during a voluntary interneship of two weeks:

Seven normal deliveries.
One extraperitoneal Cesarean section.
Transverse presentation with version.
Cesarean section for placenta previa.
Compound presentation with two feet, hand, occiput and prolapsed cord.
Cesarean section for a monster, dicephalus tetratrochius.
Ten plastic operations.
Two ovarian cysts.
One hydrosalpinx.
One salpingitis.
One exploratory laparotomy.
One supra-vaginal hysterectomy.
One large ovarian cyst.
One cancer of the sigmoid; resection.
Six D. and C.
Three appendectomies.
One gas anesthesia.
A radium application.
Two intravenous injections of salt solution.
One blood transfusion.
Two inevitable abortions.
One uterine irrigation.
One ruptured ectopic gestation.

This same individual had another compulsory week's interneship in the hospital; a two weeks' voluntary service in the out-patient department and another compulsory ten-day period; a year of theoretical lectures; another year of clinics, conferences, section work and ward classes in which he saw, heard described and personally assisted in the treatment of

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a large additional number of cases such as have been just detailed.

The following question naturally suggests itself: If the chief of an obstetrical department must be an accomplished pelvic and abdominal surgeon; if his department properly organized and conducted controls an amount of clinical material that no other can rival; if he alone in the medical faculty can teach all the conditions which the physician must treat in women, is it pedagogically or economically justifiable to maintain in a medical school a so-called gynecologic department which can only duplicate the teaching of the surgical and obstetric departments and in a manner necessarily inferior to both?

This question has already been answered in the only way it could be answered, by the majority of our best medical schools; it is being similarly answered today as opportunity occurs by vacancies in existing chairs, and it will presently be answered conclusively and finally. As an interested observer, an occasional participant in the *Transactions* and an old member of this Society, it appears to me impolitic to allow a movement which vitally concerns us all to gain irresistible headway and to reach its ultimate goal, apparently ignored by the very organization that should have fostered and directed it.

The reason for our past attitude is obvious: Some of the members occupying positions which are now anomalous and anachronistic would perhaps feel hurt by this discussion. Others, disinterested, might, in the spirit of a *laudator temporis acti,* be honestly convinced that the old order should not be disturbed. But the issue is too important to be influenced by self-interest or unprogressive minds.

This is the only country in the world now rich enough adequately to equip its medical schools; consequently the hegemony of the medical education of the world lies within our grasp if, having the money, we have the wit to seize it.

Apparently the world's center of wealth, power and civilization, shifting with the ages from Mesopotamia, Egypt, Greece, Rome and Northern Europe, is moving to this continent. It

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is an inspiring thought that each one of us puny mortals in his tiny sphere may play a part in such a stupendous cosmic drama. Let us teachers of one of the most important medical branches put our house in order that we may merit a place among those who assist and do not hinder the passage to America of the world's leadership in medical education.

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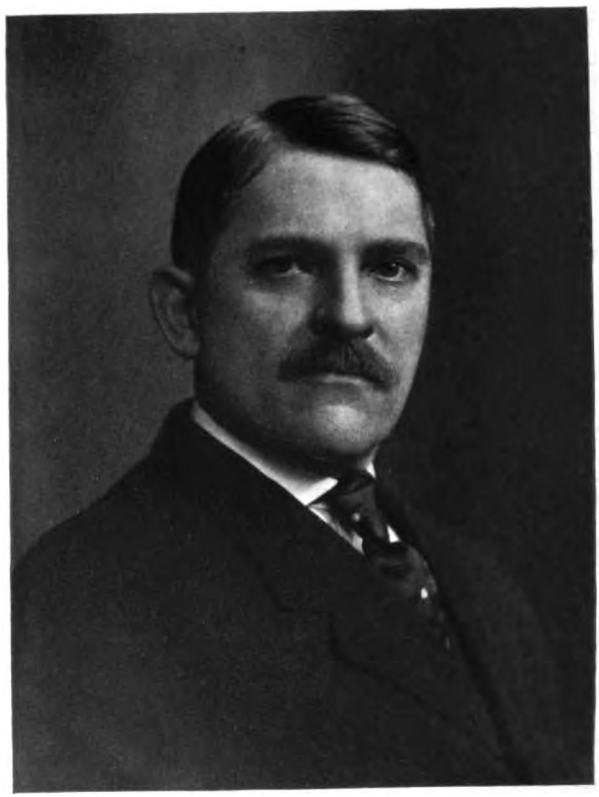

H. O. Wurden

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IN MEMORIAM

XAVIER OSWALD WERDER, M.D., F.A.C.S.

By SIDNEY A. CHALFANT, M.D.
Pittsburgh, Pa.

XAVIER OSWALD WERDER was born in Cham Jug, Switzerland, December 4, 1857. His parents were Oswaldmus and Barbara (Selder) Werder. In 1871, at the age of fourteen years, he came to this country and at once entered St. Vincent's College at Beatty, Pa., where he remained two years and then studied theology for one year at St. Michael's Seminary, Pittsburgh. After teaching school for one year he entered the medical department of the University of Maryland but completed his course at the University of the City of New York and graduated from that institution in 1879. The next year was spent as intern at St. Francis Hospital, Pittsburgh and the following three years in general practice in the West End, Pittsburgh, Dr. Werder then went abroad for post-graduate study remaining two years at Berlin, Vienna, Munich and Oxford. On his return to this country he resumed his practice but was very soon appointed assistant gynecologist to Mercy Hospital and two years later chief gynecologist. This position he held until his death, which occurred from pneumonia on November 20, 1919.

Dr. Werder was the pioneer in modern gynecology in Pittsburgh. In 1897 he was elected professor of gynecology in the Western University of Pennsylvania, now the University of Pittsburgh, which position he held until his death. In 1899 he was instrumental in organizing the staff of the Pittsburgh

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Hospital and was made consulting gynecologist. He was one of the early members of the American Association of Obstetricians and Gynecologists, its treasurer for eight years and president in 1914. He was a charter member of the American College of Surgeons and president of the Allegheny County Medical Society in 1909. In 1916 he was elected a member of the American Gynecological Society.

Dr. Werder was the first in Western Pennsylvania to do a gastroenterostomy. He was greatly interested in cancer of the cervix. He early advocated and performed the radical operation practically as later popularized by Wertheim, and his results of 46 per cent. five-year cures in 38 cases has been equalled by few men. As a teacher he was clear, logical and concise and an inspiration to his students. It was as his intern in the Mercy Hospital that the writer first knew him, and will always remember him as a careful, conscientious and painstaking surgeon, a good operator and a careful and able diagnostician. Dr. William J. Mayo, on a visit to Pittsburgh, was heard to remark after visiting Dr. Werder's Clinic "There is a surgeon."

As a man Dr. Werder was very quiet and unassuming, a devoted husband and father, a faithful friend and an inspiration to the young man in the profession.

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